FURUNO

INSTALLATION MANUAL

MARINE RADAR

MODEL FR-2115/2125

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SAFETY INSTRUCTIONS

WARNING

Radio Frequency Radiation Hazard

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 and 10 W/m^2 exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible—Ask your FURUNO representative or dealer to provide this feature.

Model	Radiator type	Distance to 100 W/m^2 point	Distance to 10 W/m^2 point
FR-2115	XN12AF	0.10 m worst case	3.50 m
	XN20AF		3.50 m
	XN24AF		1.40 m
FR-2125	XN12AF	1.10 m worst case	10.0 m worst case
	XN20AF		
	XN24AF		

WARNING



ELECTRICAL SHOCK HAZARD

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.



Wear a safety belt and hard hat when working on the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Construct a suitable service platform from which to install the antenna unit.

Serious injury or death can result if someone falls from the radar antenna mast.

Turn off the power at the mains switchboard before beginning the installation.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

Do not install the display unit where it may get wet from rain or water splash.

Water in the display unit can result in fire, electrical shock or equipment damage.

⚠ WARNING

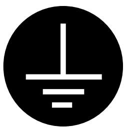
Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

Use only the specified power cable.

Fire or equipment damage can result if a different cable is used.

⚠ CAUTION



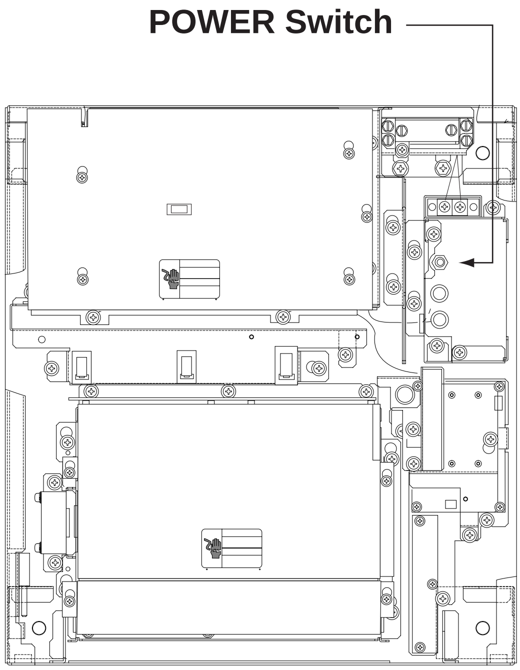
Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent deviation of a magnetic compass:

	Standard compass	Steering compass
Display Unit	1.70 m	0.90 m
Scanner Unit (2115)	1.70 m	1.90 m
Scanner Unit (2125)	2.10 m	1.20 m

POWER Switch in AC Powered Display Unit

The display unit designed to run on AC power has a power switch inside its base which cuts off 100/200 VAC power to the display unit. Pull the display unit forward several centimeters to access the switch. TURN THE SWITCH OFF (as well as the main POWER switch) WHENEVER ACCESSING INSIDE THE DISPLAY UNIT.



Display unit, inside view

TABLE OF CONTENTS

EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Scanner Unit	XN12AF-RSB0074-062	—	1	FR-2115, 24 rpm, 1200mm, CP03-24201
	XN12AF-RSB0075-062	—		FR-2115, 42 rpm, 1200mm, CP03-24201
	XN20AF-RSB0074-062	—		FR-2115, 24 rpm, 2000mm, CP03-19101
	XN20AF-RSB0075-062	—		FR-2115, 42 rpm, 2000mm, CP03-19101
	XN24AF-RSB0074-062	—		FR-2115, 24 rpm, 2400mm, CP03-19101
	XN24AF-RSB0075-062	—		FR-2115, 42 rpm, 2400mm, CP03-19101
	XN12AF-RSB0074-063	—		FR-2125, 24 rpm, 1200mm, CP03-24201
	XN12AF-RSB0075-063	—		FR-2125, 42 rpm, 1200mm, CP03-24201
	XN20AF-RSB0074-063	—		FR-2125, 24 rpm, 2000 mm, CP03-19101
	XN20AF-RSB0075-063	—		FR-2125, 42 rpm, 2000 mm, CP03-19101
	XN24AF-RSB0074-063	—		FR-2125, 24 rpm, 2400 mm, CP03-19101
	XN24AF-RSB0075-063	—		FR-2125, 42 rpm, 2400 mm, CP03-19101
Display Unit	RDP-124	—	1	
Spare Parts	SP03-12500	000-089-390	1	DC ship's mains
	SP03-12510	000-089-391		100 VAC ship's mains

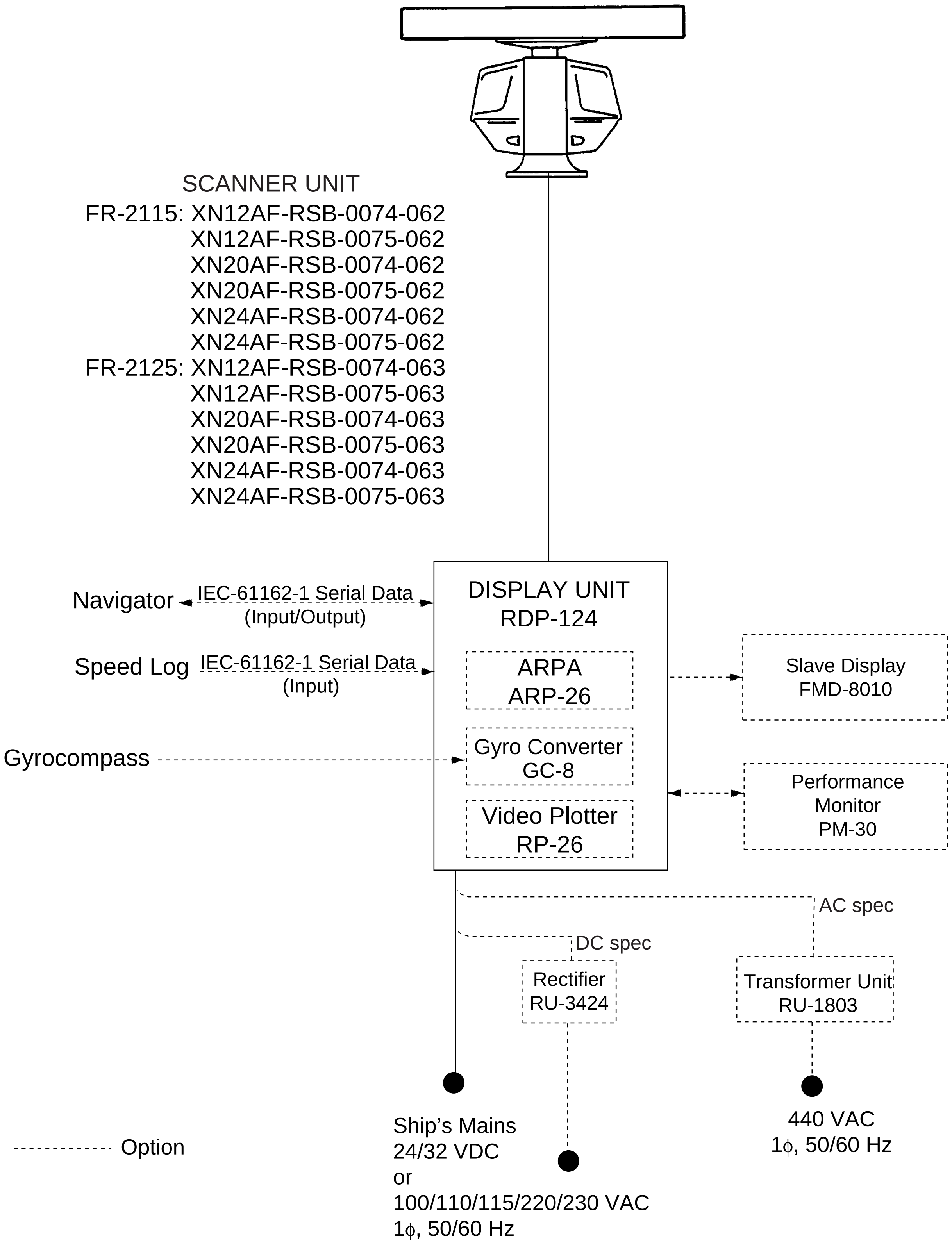
Standard Supply

Name	Type	Code No.	Qty	Remarks	
Installation Materials	CP03-19100	000-089-393	1	CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-75-15 (15 m signal cable)	See packing lists
	CP03-19110	000-089-394		CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-75-20	
	CP03-19120	000-089-395		CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-75-30	
	CP03-19130	000-089-396		CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-74-15 (15 m signal cable)	
	CP03-19140	000-089-397		CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-74-20	
	CP03-19150	000-089-398		CP03-19104 (Scanner unit), CP03-19103 (Display unit), S03-74-30	
Accessories	FP03-06510	000-089-400	1	FP03-06201, FP03-06502, FP03-06503, Dust cover CRT (03-144-1338)	
	FP03-06550	000-089-476		For console type FP03-06201, FP03-06502, FP03-06503, FP03-06504, Dust cover CRT (03-144-1338)	

Optional Equipment

Name	Type	Code No.	Remarks
Gyro Converter	GC-8	008-446-520	Separate order
Interswitch	RJ-7	—	
Interswitch	RJ-8	—	
Performance Monitor	PM-30	—	Mandatory for IMO radar
Transformer Unit	RU-1758	000-030-416	For 100/110/220 VAC
Transformer Unit	RU-1803	000-030-420	For 440 VAC
Rectifier	RU-3424	000-030-497	
Performance Monitor Installation Kit	OP03-150	008-485-490	
ARPA	ARP-26-2E	008-485-500	
Video Plotter	RP-26-T-2E	008-485-510	
	RP-26-Z-2E	008-485-520	For separate type control head
Slave Display	FMD-8010	—	
Separate Control Head Mounting Kit	OP03-151	008-485-530	
Power Cable	CVV-S (8X2C)-15 m	000-560-634	For DC spec. display unit
Alarm Kit	OP03-156	008-500-650	
AC-DC Conversion Kit	OP03-161-24	008-499-760	24 rpm antenna
AC-DC Conversion Kit	OP03-161-42	008-499-770	24 rpm antenna
Interface Unit	IF-2300	—	Mandatory for IMO radar

SYSTEM CONFIGURATION



AC spec or DC spec to be selected.

MOUNTING

1.1 Scanner Unit

Mounting considerations

- The scanner unit is generally installed either on top of the wheelhouse or on the radar mast, on a suitable platform. Locate the scanner unit where there is a good all-round view.

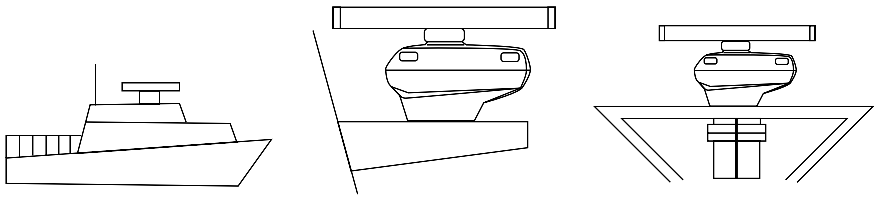


Figure 1-1 Mounting methods

- No funnel, mast or derrick should be within the vertical beamwidth of the scanner in the bow direction, especially zero degrees ±5°, to prevent blind sectors and false echoes on the radar picture.
- It is rarely possible to place the scanner unit where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.
- Locate the antenna of a direction finder clear of the scanner unit to prevent interference to the direction finder. A separation of more than two meters is recommended.
- To lessen the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.
- A magnetic compass will be affected if placed too close to the scanner unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass,1.70 m (FR-2115), 2.10 m (FR-2125), Steering compass, 1.90 m (FR-2115), 1.20 m (FR-2125).
- Do not paint the radiator aperture, to ensure proper emission of the radar waves.
- The signal cable run between the scanner and the display is available in lengths of 15 m (standard), 20 m, and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
- The scanner base is made of cast aluminum. To prevent electrolytic corrosion of the scanner base, use the seal washers and corrosion-proof rubber mat and ground the unit with the ground wire (supplied).
- Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The scanner unit must not be mounted where the temperature is more than 70°C.
- Leave sufficient space around the unit for maintenance and servicing. See the scanner unit outline drawing for recommended maintenance space.

Assembling the scanner unit

The scanner unit consists of the scanner radiator and the scanner unit chassis, and they are packed separately. Fasten the scanner radiator to the scanner unit chassis as follows:

1. For the XN20AF, XN24AF, attach two guide pins to the underside of the scanner radiator.
2. Remove the waveguide cap from the radiator bracket. The cap may be discarded.
3. Coat the waveguide flange with anticorrosive sealant as shown in Figure 1-2.

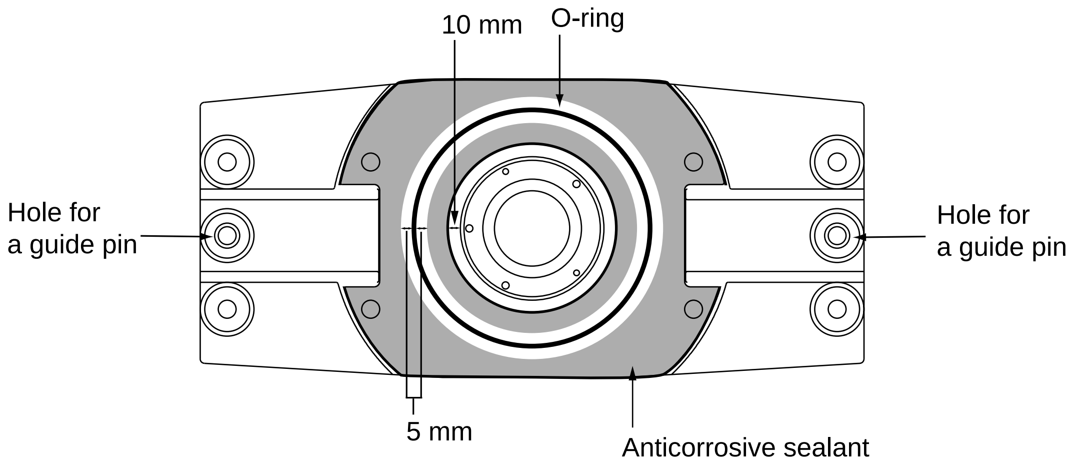


Figure 1-2 Coating the waveguide flange with anticorrosive sealant

4. Coat fixing holes for the scanner radiator with anticorrosive sealant.
5. Grease the O-ring and set it to the O-ring groove of the radiator flange.
6. Set the scanner radiator to the radiator bracket.
7. For the XN20AF, XN24AF, coat hex bolts (M8 x 40, slotted washer head, 8pcs.) with anticorrosive sealant and use them to loosely fasten the scanner radiator to the scanner unit chassis. For the XN12AF, coat hex bolts, flat washers and spring washers with anticorrosive sealant and use them to loosely fasten the scanner radiator to the scanner unit chassis.
8. Remove two guide pins (inserted at step 1), and then tighten fixing bolts.

⚠ CAUTION

Be sure to remove the guide pins.

Injury may result if the guide pins loosen and fall.

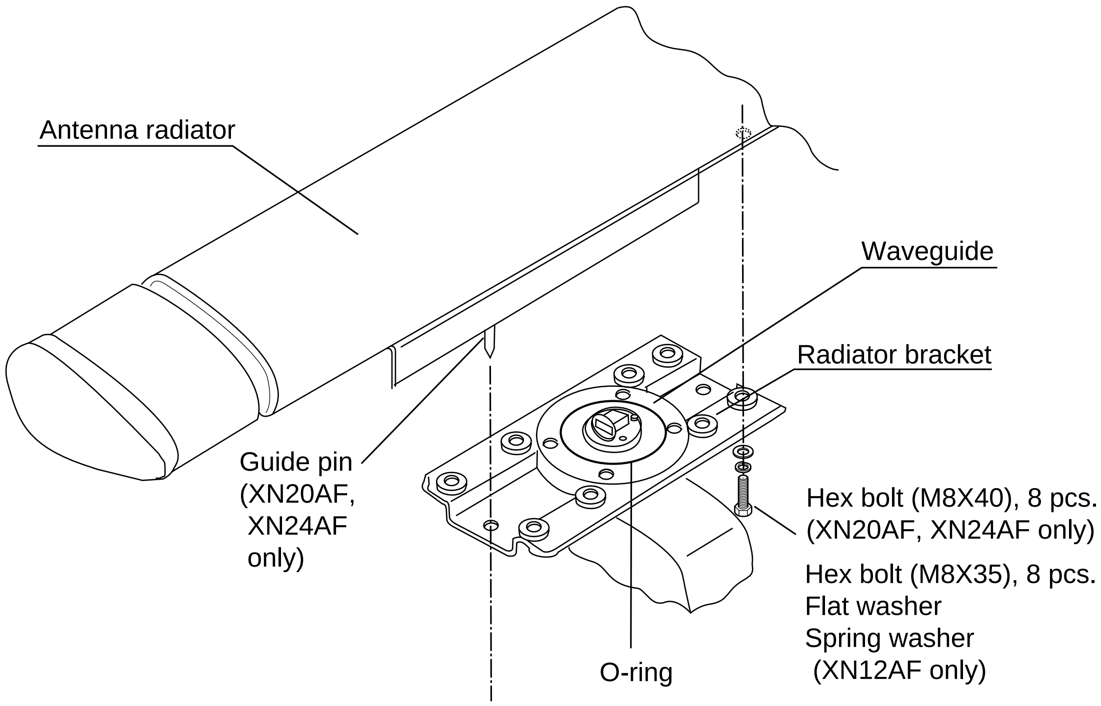


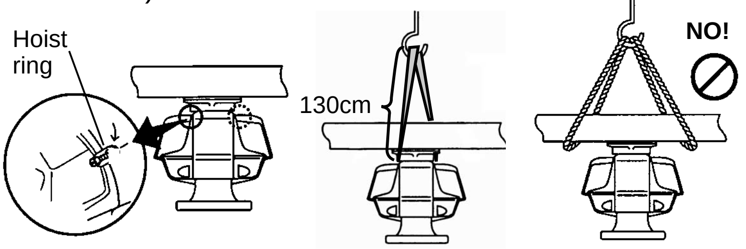
Figure 1-3 Fastening the radiator to the radiator bracket

Fastening the scanner unit to the mounting platform

The scanner unit may be assembled before hoisting it to the mounting platform. However, do not lift the scanner unit by the radiator. Always hold the unit by its housing. When using a crane or hoist, lift the unit by the hoist rings which should be fastened to the bolt fixing covers of the scanner housing.

⚠ CAUTION

DO NOT lift the antenna unit by the radiator; lift it by the hoist rings. (Be sure to remove rings after hoisting the antenna unit.)



1. Construct a suitable mounting platform referring to the outline drawing at the back of the manual.
2. Drill four mounting holes of 15 mm diameter and one cable entry hole of about 50 mm diameter in the mounting platform.
3. Lay the rubber mat (supplied) on the mounting platform.

4. Place the scanner unit on the rubber mat orienting the unit so the bow mark on its base is facing the ship’s bow.

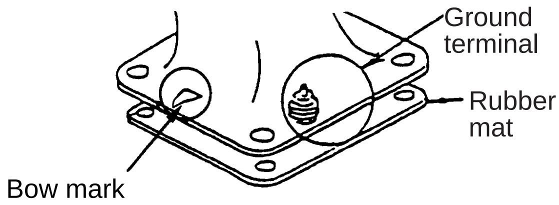
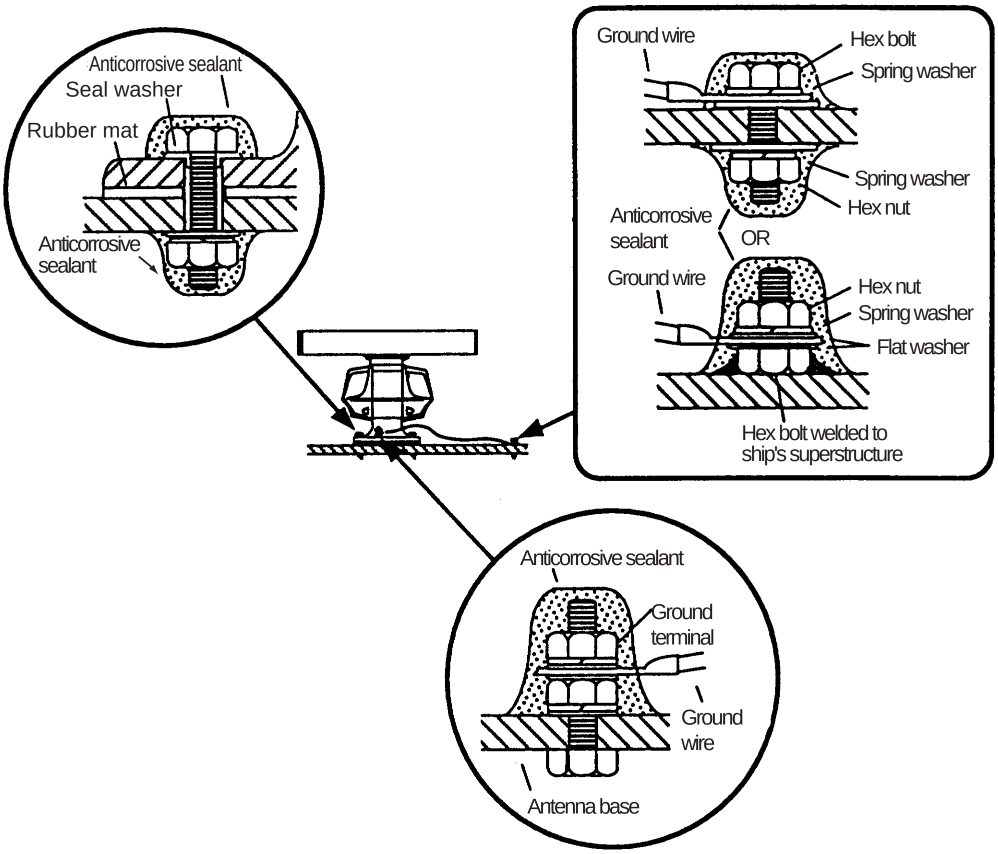


Figure 1-4 Scanner unit, front view

5. Fasten the scanner unit to the mounting platform with M12x60 hex bolts, nuts, flat washers and seal washers.
6. Using hex bolt (M6x25), nut (M6) and flat washer (M6) establish the ground system on the mounting platform as shown in Figure 1-5. The location should be within 370 mm of the ground terminal on the scanner unit. Connect the ground wire (RW-4747, 370 mm, supplied) between the grounding point and ground terminal on the scanner unit. Coat the entire ground system with silicone sealant (supplied).



⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Figure 1-5 How to mount the scanner unit

1.2 Display Unit

Before mounting the display unit

If Gyro Converter GC-8 (option) is to be used, install and setup the GYRO CONVERTER Board before mounting the display unit, because of the difficulty involved in doing it after the display unit is installed. Instructions for installation and setup are in Chapter 4.

Mounting considerations

When selecting a mounting location, keep in mind the following points:

- Select a location where the display unit can be viewed and operated conveniently and where the screen can be viewed while facing towards the bow.
- Locate the unit out of direct sunlight and way from heat sources because of heat that can build up inside the cabinet.
- Locate the equipment away from places subject to water splash and rain.
- The display unit is very heavy. Be sure the mounting location is strong enough to support the weight of the unit under the continued vibration which is normally experienced on the ship. If necessary reinforce the mounting location.
- Determine the mounting location considering the length of the signal cable between the scanner unit and the display unit. (The signal cable comes in lengths of 15, 20 or 30 meters; maximum 100 meters).
- Leave sufficient space on the sides and rear of the unit to facilitate maintenance. Also, leave a foot or so of “service loop” in cables behind the unit so it can be pulled forward for servicing or easy removal of connectors.
- A magnetic compass will be affected if placed too close to the display unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 1.70 m, Steering compass, 0.90 m.

Mounting procedure

Tabletop mounting

Two people are necessary to complete this procedure.

1. Make four holes of 12 mm diameter in the mounting location referring to the outline drawing at end of this manual.
2. Unfasten the screws fixing the right and left arm covers on the control head.
3. Unfasten bolts (four total) hidden by the arm covers.

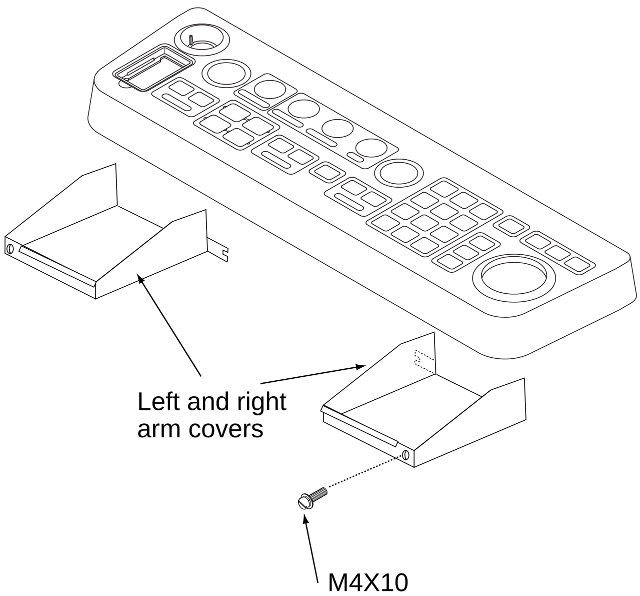


Figure 1-6 Control head

4. While one person is holding the mounting base at the sides, pull the handle on the underside of the control head to draw the display unit toward you until you hear a click.

> ⚠ **CAUTION**
>
> **Use two people to complete this step.**
>
> The display unit may fall to the deck when it is pulled forward, since the mounting base is not yet fastened to the mounting location.

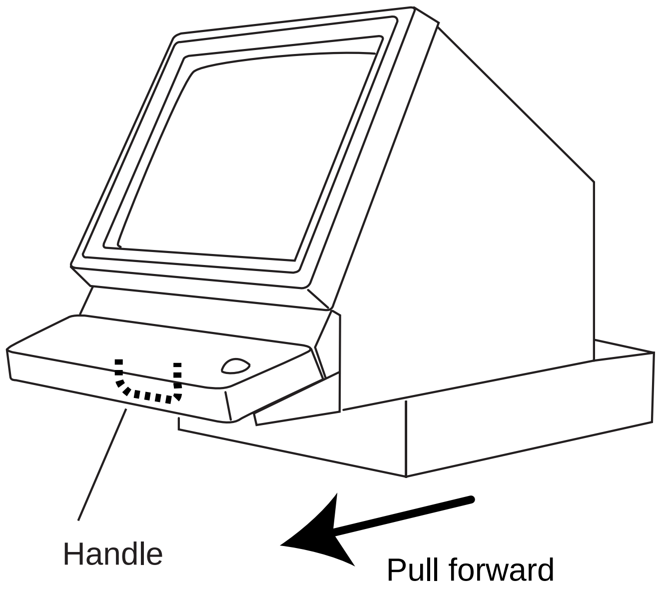


Figure 1-7 Display unit

5. This step requires two people to complete. While raising the monitor until the CRT is horizontal, fix the stay as follows:

   a) Raise the stay as shown below.

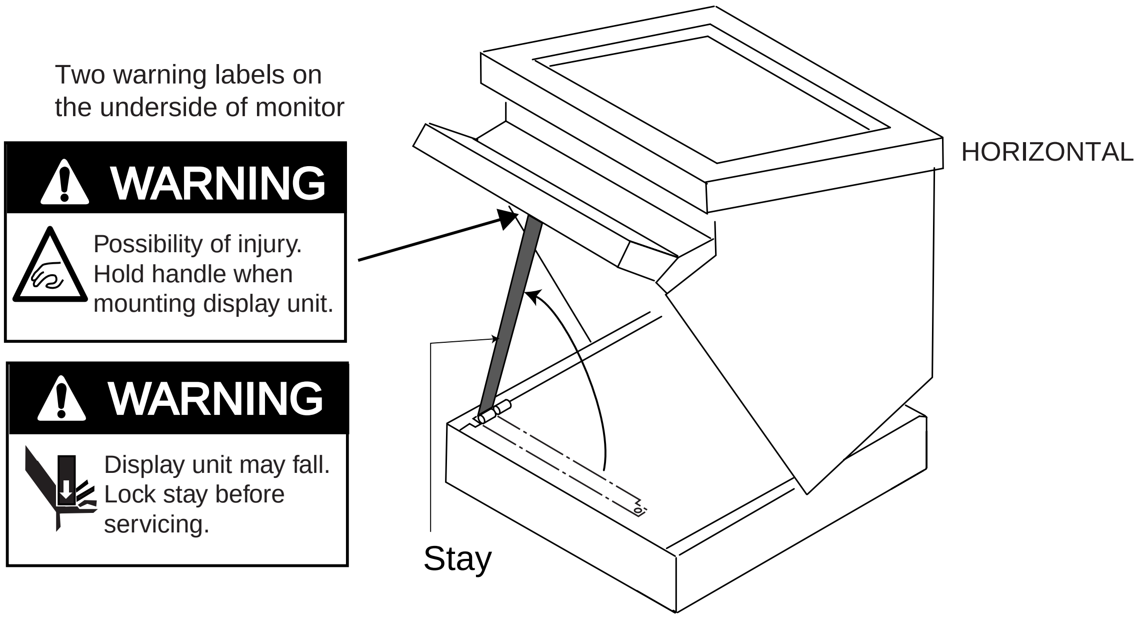


Figure 1-8 Display unit, inside view

b) While pushing the stopper, set the catch on the display unit in the hole at the front edge of the stay.

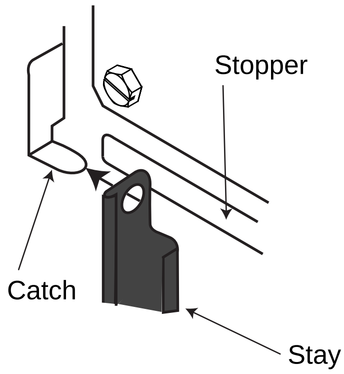


Figure 1-9 Setting catch to hole in stay

c) Release hand from stopper.

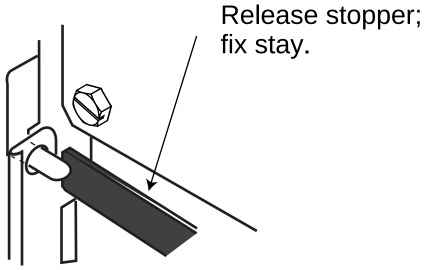


Figure 1-10 Stay fixed

6. Fasten the display unit to the mounting location at front fixing holes (2 points) with M10 bolts, nuts and flat washers, using the pipe box spanner (supplied).
7. Retract the stay and lower the monitor.
8. The rear left fixing hole is hidden under the PTU board cover. Remove the cover as follows:

   (1) Unfasten five M3x8 screws at the top of the PTU cover and two M4x8 screws at the front of the cover to slide the cover toward you.

(2)Remove the cover by grasping the knob on the top of the cover.

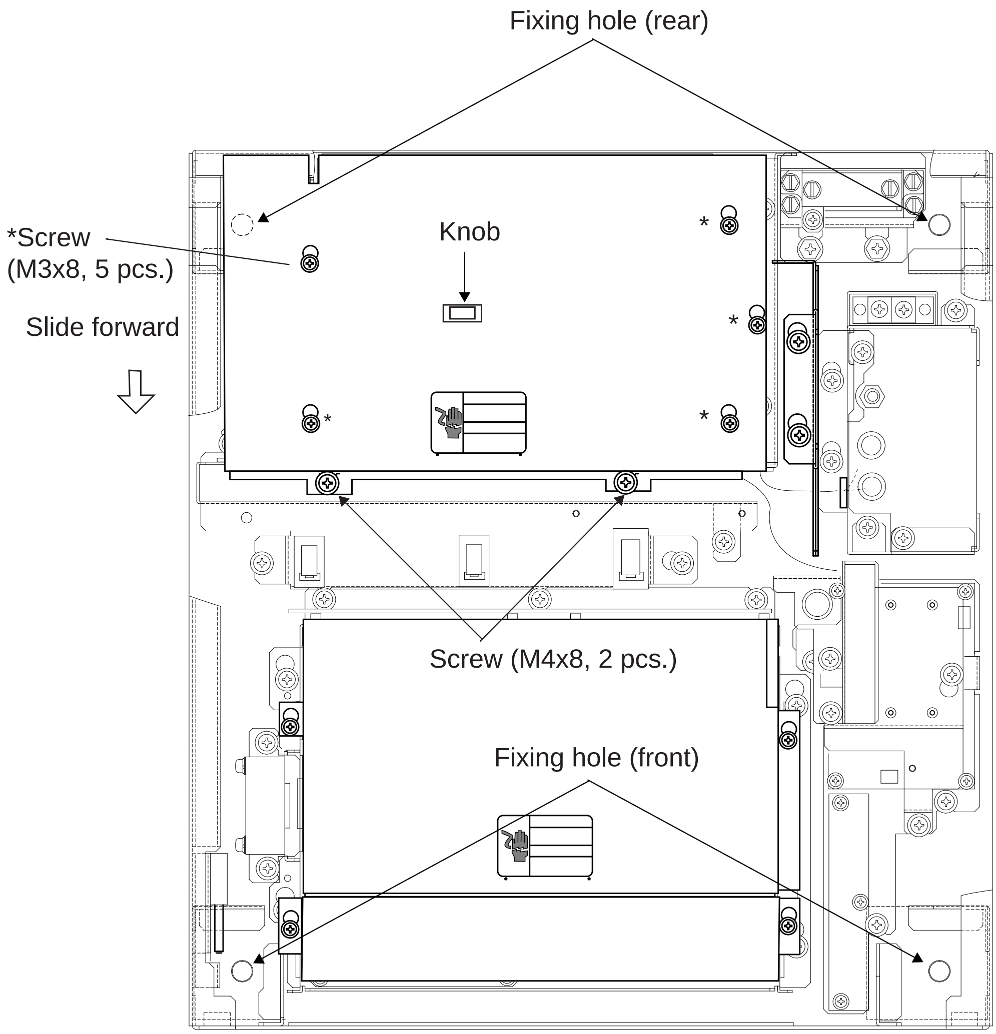


Figure 1-11 How to dismount the PTU cover

9. Fasten the display unit to the mounting location at rear fixing holes (2 points) with M10 bolts, nuts and flat washers, using the pipe box spanner (supplied)
10. Close the PTU board cover.
11. Push the monitor forward until you hear a click.
12. Refasten the bolts removed at step 3.
13. Fix the left and right arm covers.

Console type mounting

1. Make six holes of 15 mm diameter and a cable entrance hole through the deck referring to the outline drawing at end of this manual.
2. Open the front cover.
3. Fix the equipment by using M12 bolts, nuts and washers.
4. Hoist the console to the deck by using the eye bolts attached to the console. Remove the eye bolts and set the cosmetic caps (w/washers) to the eye bolt holes.

Separating the control head

The control head connects to the display unit with a connection cable, thus it can be located where desired, using the separate control head kit (option). Follow the procedure on the next page to separate the control head from the display unit.

Separate type control head kit (Type: OP03-151, No.: 008-485-530)

Name	Type	Qty	Code No.	Remarks
Cable Assy.	UL246SB20P/1P	1	000-140-812	10 m, 03S9422
Nonslip Rubber Feet	SJ-5003	4	000-801-787	w/double-sided tape
Monitor Front Cover	03-144-1361	1	100-263-340	
KB Fixing Plate	03-144-1691	1	100-263-940	
Handle Plate	03-144-1632	1	100-268-040	
Dust Cover KB	03-144-1693	1	100-271-760	
Screw	M4x10	3	000-881-446	
Label	86-003-1011	1	100-236-230	
Nonslip Rubber	03-144-1694	1	100-271-760	

Display unit modification procedure

1. Raise the monitor unit referring to procedure for tabletop mounting on page 1-7.
2. Unplug two connectors from the control head cable (P412 from MOTHER Board and J583 and unfasten two earth wires.

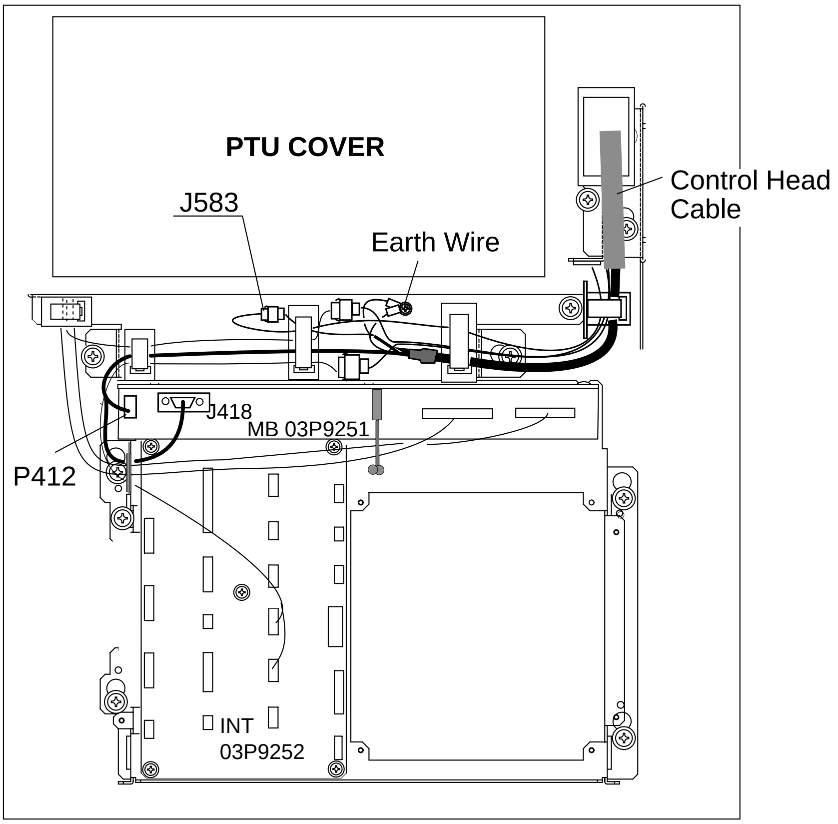


Figure 1-12 Display unit, inside view

3. Lower the monitor.
4. Unfasten the M4 screw fixing the ground terminal of the connection cable.
5. Push the monitor forward until you hear a click.
6. Unscrew four screws fixing the top cover of the display unit.
7. Remove three clamps fixing the connection cable in the monitor unit.
8. Unfasten four screws fixing the right and left brackets on the control head.
9. Unfasten four screws fixing the right and left covers of the display unit.
10. Unfasten six screws fixing the right and left KB arms.
11. Unfasten three screws fixing the panel cover.

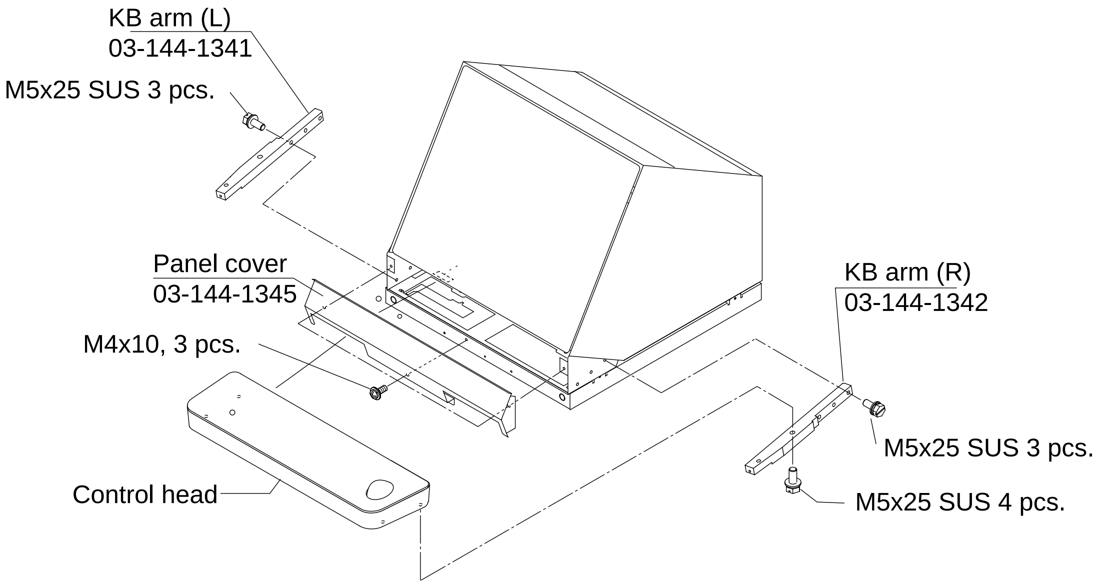


Figure 1-13 Detaching the control head

Control head modification procedure

1. Unfasten eight screws (M4X8) on the underside of the control head. Unplug connectors P314, P312 and P317 from the control head. Separate the KB bottom plate from the control head.
2. Unfasten the screw (M4) fixing the ground terminal and two screws (M4X8) fixing the clamp. Remove the connection cable assy.
3. Unfasten two screws (M6X12) from the inside of the bottom plate of the control head to dismount the handle.

4. Replace the cable assy. with cable assy. UL2464SB2-0P/1P (10 m, supplied) as below and reassemble the control head.
5. Attach warning label to the bottom plate.

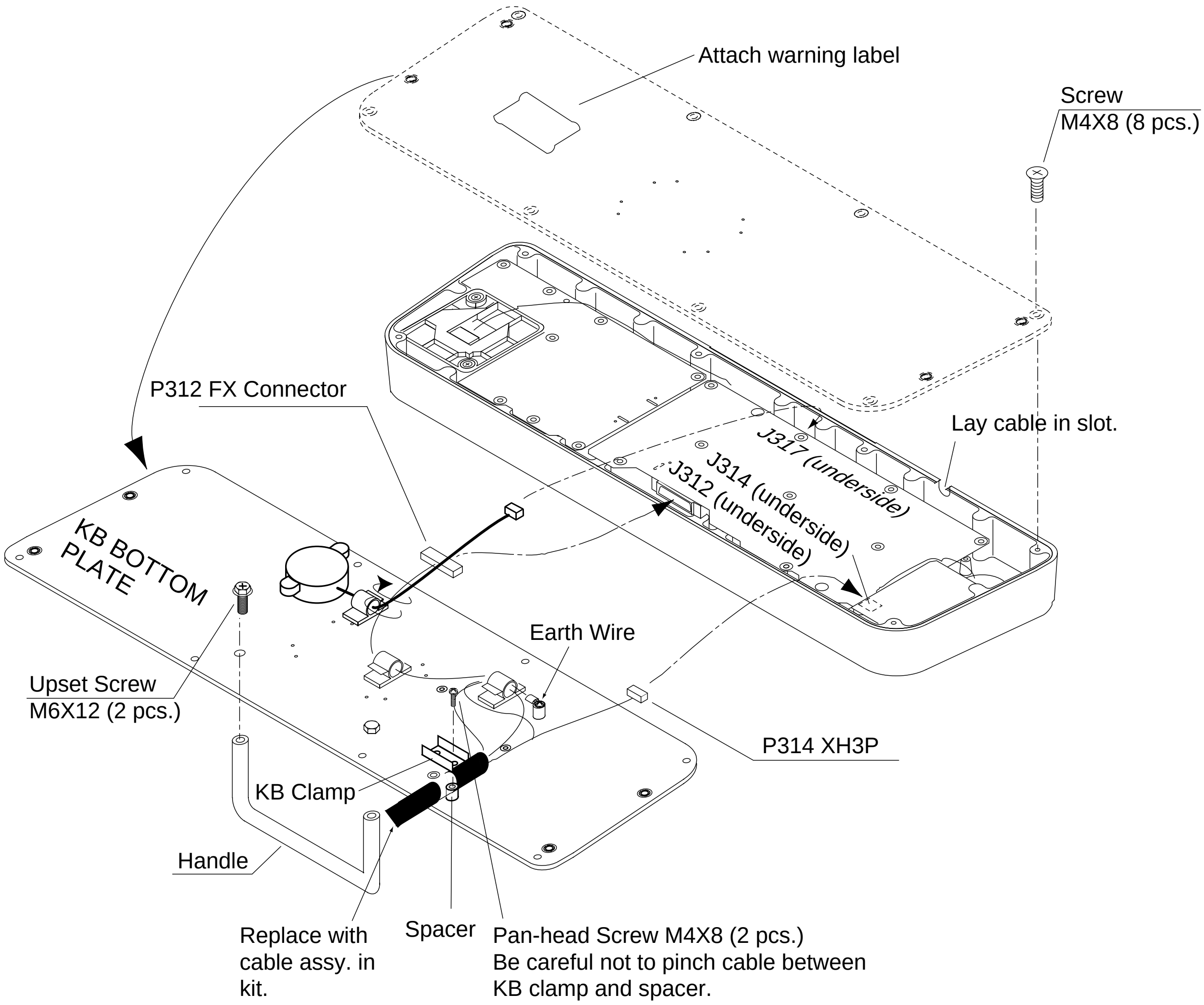


Figure 1-14 Control head

Connection of display unit to control head

1. Attach the handle to the handle plate, using the screws for the handle and bottom cover of the control head.
2. Attach the handle plate to location where the KB arms were fastened.
3. Pull the monitor toward you until you hear click.
4. Lead in the cable assy. (option) from the rear entrance of the display unit. See Chapter 2.
5. Raise the monitor and fix the stay.
6. Inside the display unit, fasten ground wire of the cable assembly with an M4 screw on the chassis.

7. Plug in two connectors of connection cable (P412, J583: See illustration on the previous page.)
8. Lower the monitor.
9. Attach the monitor front cover (option) to the place the panel cover have been, using the screw for the panel cover.
10. Attach rubber to feet to the bottom of the keyboard if the keyboard is not going to be permanently fixed. To fix the keyboard to a desired location, fasten the KB fixing plate to the keyboard and desired location with two upset screws (M5X25, formerly used to fasten KB arms) and two tapping screws (ϕ6.5, local supply) as below.

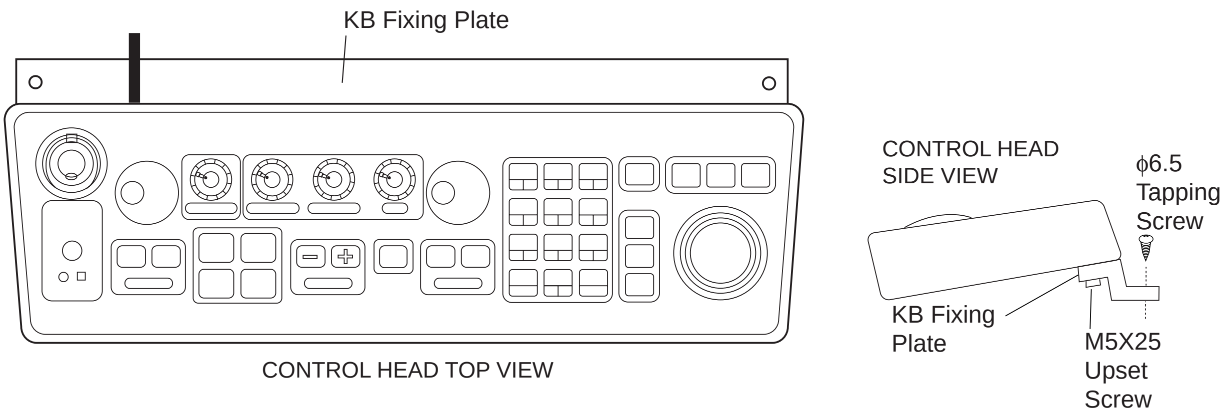


Figure 1-15 How to attach KB fixing plate

11. Set dust cover KB (supplied) on the control head.

Attachment of hood

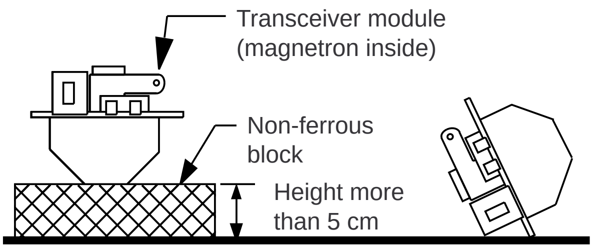
1. Set two spacers (supplied) to the lower two of the four M5 holes in the CRT panel.
2. Screw two screws (supplied) into the holes in the hood.
3. Set the bottom of the hood to the screws at the bottom of the CRT panel, and then fasten the two screws at the top of the hood to the CRT panel.

WIRING

2.1 Scanner Unit

⚠ CAUTION

The magnetron in the transceiver module will de-magnetize if it contacts ferrous material. When dismounting the transceiver module, lay it on its side or on top of non-ferrous material as shown below.



1. Open the scanner unit cover.
2. Disconnect plugs P611, P801 and P821.
3. Unfasten the transceiver module (two bolts). Remove the transceiver module.

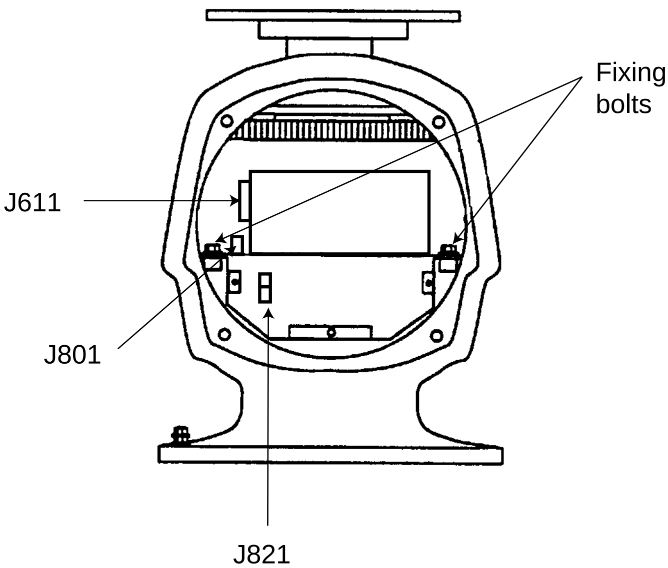


Figure 2-1 Scanner unit, front view

4. Unfasten the four fixing bolts on the cable gland at the base of the scanner unit. Remove clamping ring, rubber gasket and washers.

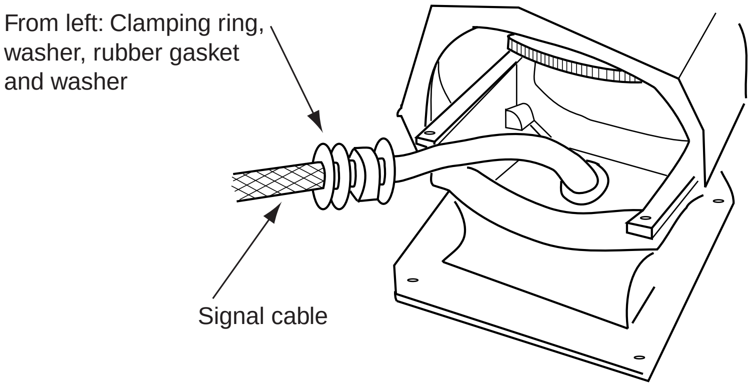


Figure 2-2 Scanner unit, front view, cover removed

5. Pass the signal cable through the cable entry hole in the scanner unit mounting platform. Trim the cable so about 80 cm of it protrudes past the cable gland.
6. Slide the clamping ring, washer, rubber gasket and washer onto the cable in that order.
7. Fabricate the signal cable as shown on page 2-4 (signal cable S03-74), or page 2-5 (signal cable S03-75).
8. Referring to Figure 2-3, pass the outer and inner shields between the signal cable and the clamping ring. Fasten the cable gland.

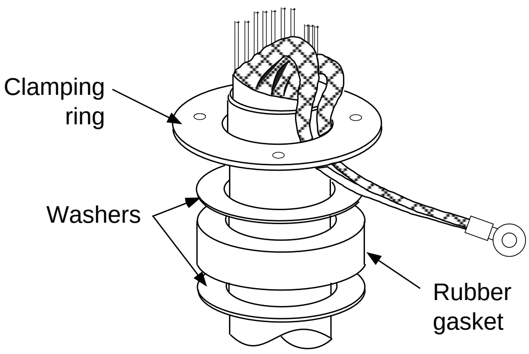


Figure 2-3 Passing cable shields between cable and clamping ring

9. Connect the signal cable to the terminal board RTB801 by referring to the interconnection diagram. Leave “slack” in the coaxial wire to prevent breakage.
10. Bind cores of cables with cable ties.
11. Mount the transceiver module. Connect plugs P611, P801 and P821. Fasten the shield to the ground terminal on the transceiver module.

12. If the scanner is mounted 2° or more left of ship’s bow, adjust the position of S901 so it becomes “on” (contact between #1 and #2 on pcb MP-3795). To access S901, open the bow side cover; S901 is above the drive gear.

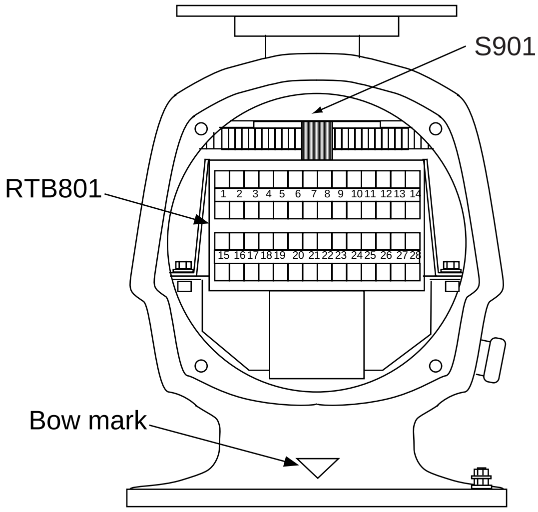


Figure 2-4 Scanner unit, front view

13. Confirm that all screws are tightened and all wiring is properly made. Coat waterproofing gasket, bolts and tapping holes of scanner unit with silicone grease. Check that the waterproofing gasket is seated as shown in Figure 2-5. Close the scanner unit cover.

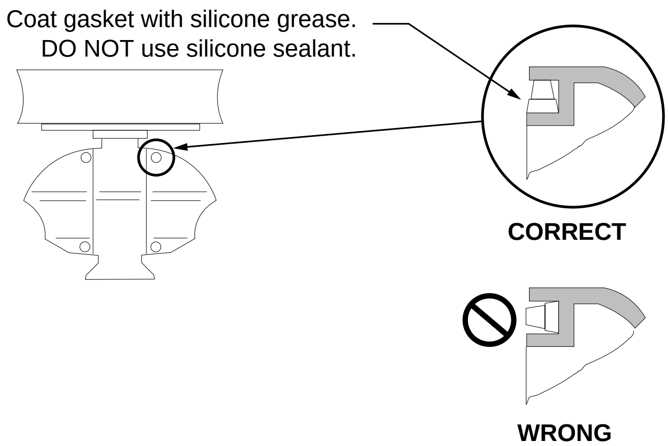


Figure 2-5 Correct seating of waterproofing gasket

Fabricating signal cable S03-75

1. Remove the vinyl sheath by 450 mm.
2. Slide the clamping ring, washer, rubber gasket and washer onto the signal cable in that order.
3. Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores to aid in identification.
4. Attach EMI cores to all inner cores and all outer cores, and tie them with cable ties, etc..

   Note: There are two types of the EMI core, thick and thin.
5. Trim each core (except coaxial wire) considering its location on the terminal board.
6. Trim the inner and outer shields leaving 500 mm each. Twist shields together and attach crimp-on lug FV5.5-4 (blue, ø4).
7. Remove insulation of each core by about 6 mm. Fix crimp-on lug FV1.25-M3 (red, ø3) to each core.
8. Fabricate the coaxial cable. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red, ø3) to coaxial cable.

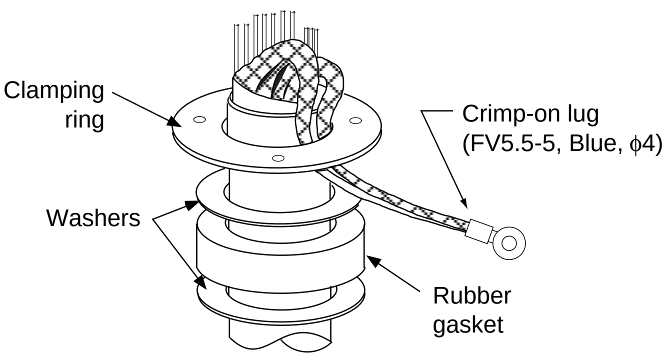


Figure 2-7 How to ground signal cable S03-75

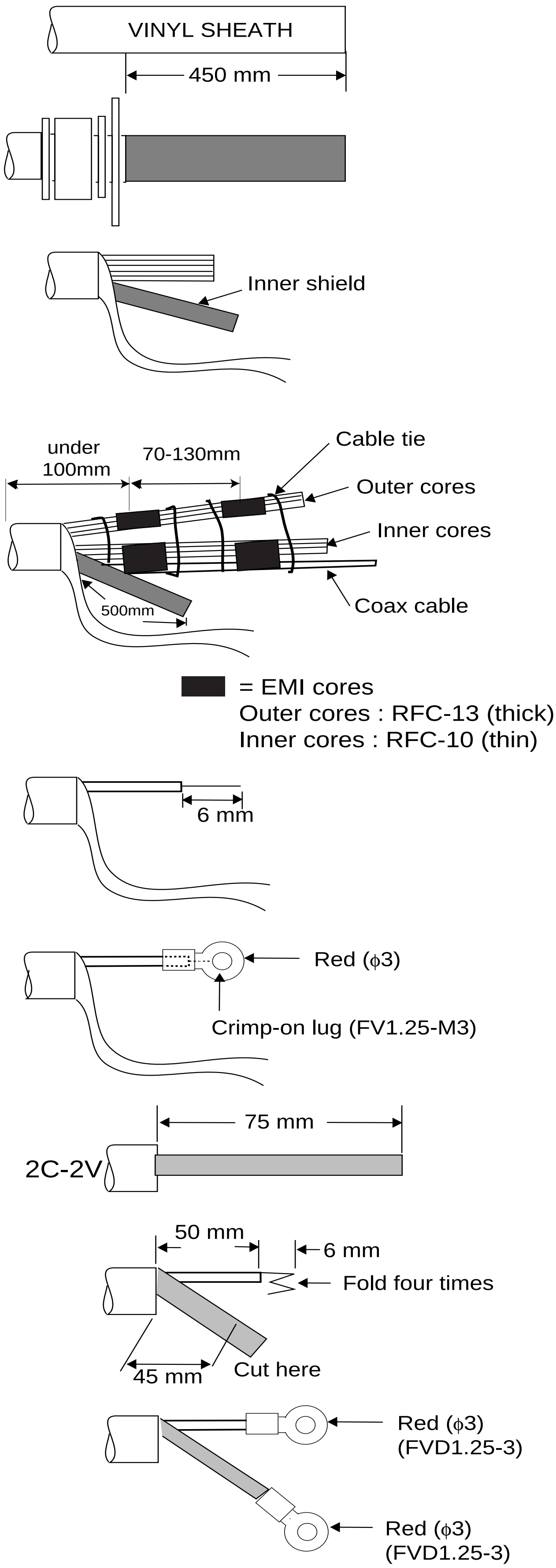


Figure 2-6 How to fabricate signal cable S03-75

Fabricating signal cable S03-74

1. Remove the anti-corrosive sheath by 500 mm. Remove the armor and vinyl sheath leaving 50 mm each approximately.
2. Fold back the armor and trim to suitable length. Then, slide the washer, rubber gasket, washer and clamping ring onto the cable in that order.
3. Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores for later identification.
4. Attach EMI cores to all inner cores and outer cores, and tie them with cable ties, etc..

   Note: There are two types of EMI core, thick and thin.
5. Trim each core (except coaxial core) considering its location on the terminal board.
6. Trim the inner and outer shields leaving 50 cm each. Twist shields together and attach crimp-on lug FV5.5-4 (blue, ø4).
7. Remove insulation of each core by 6 mm approximately. Attach crimp-on lug FV1.25-M3 (red, ø3) to each core.
8. Fabricate the coaxial cable. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red, ø3) to coaxial cable.

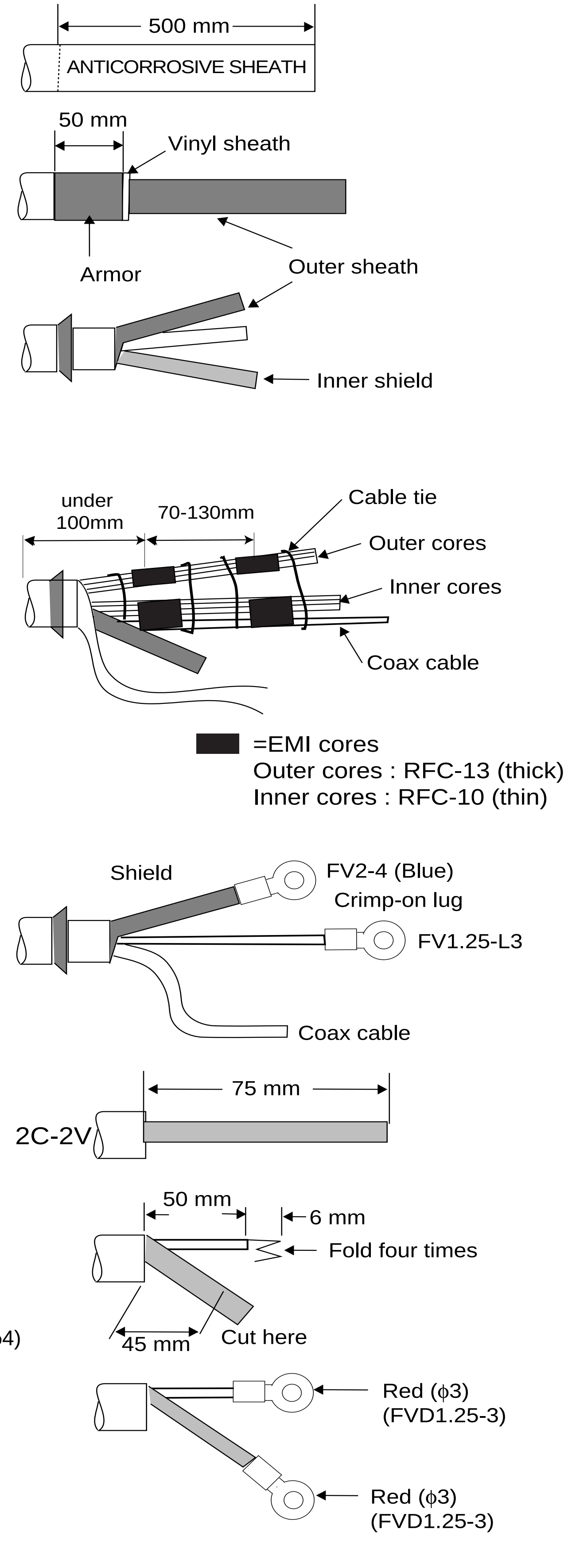


Figure 2-8 How to fabricate signal cable S03-74

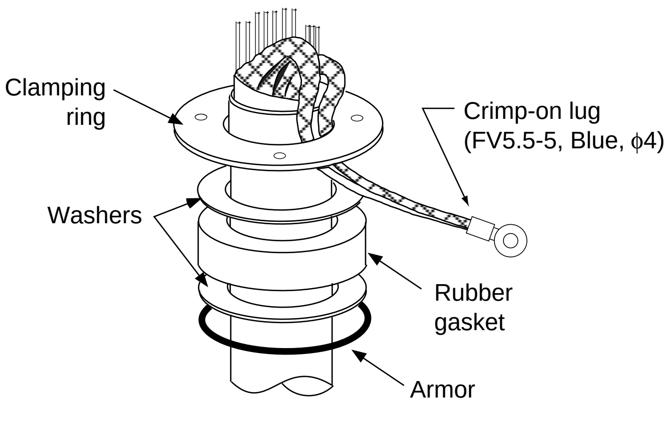


Figure 2-9 How to ground signal cable S03-74

2.2 Display Unit

Two cables are terminated at the display unit: the signal cable S03-74 or S03-75 and the power cable. The signal cable comes with a connector preattached to it for connection to the display unit. Fabricate the power cable as below.

Fabricating the AC power cable (supplied)

1. Remove the vinyl sheath by 80 mm.
2. Cut off jute tape wrapped around the armor.
3. Unravel the armor to expose the cores by about 35 mm.
4. Remove insulation of cores by about 10 mm. Fix crimp-on lugs to the cores and armor.
5. Cover the armor with vinyl tape, leaving the portion which will lie inside the cable clamp untaped.

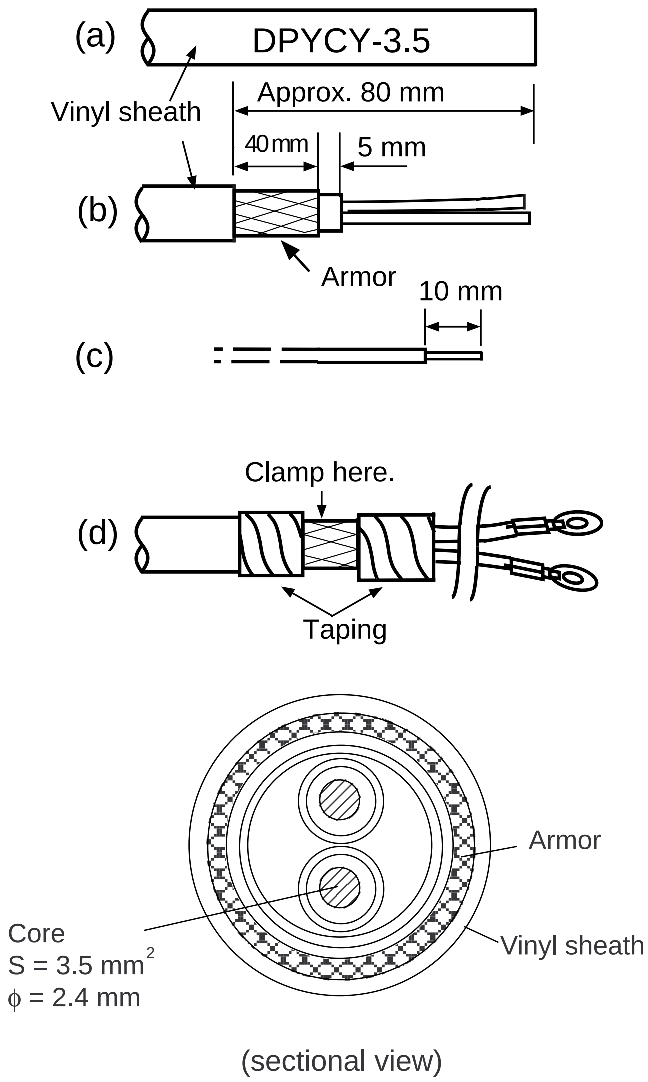


Figure 2-10 Fabricating power cable DPYCY-3.5

Fabricating the DC power cable (CVV-S 8 x 2C, option)

1. Remove the vinyl sheath by 100 mm.
2. Unravel the braided shield 60 mm from end of cable.
3. Remove the jute tape and inclusion from cable.
4. Expose the cores by 50 mm.
5. Expose the shield by 60 mm. Tape 10 mm of the shield tip.
6. Remove the sheath of cores by 10 mm. Attach crimp-on lugs type 8NK4 to the cores and crimp-on lug type FV5.5-4 (yellow) to the shield.
7. Tape the cable as shown in the figure below. Fasten the shield to screw (M4) on the cable clamp.

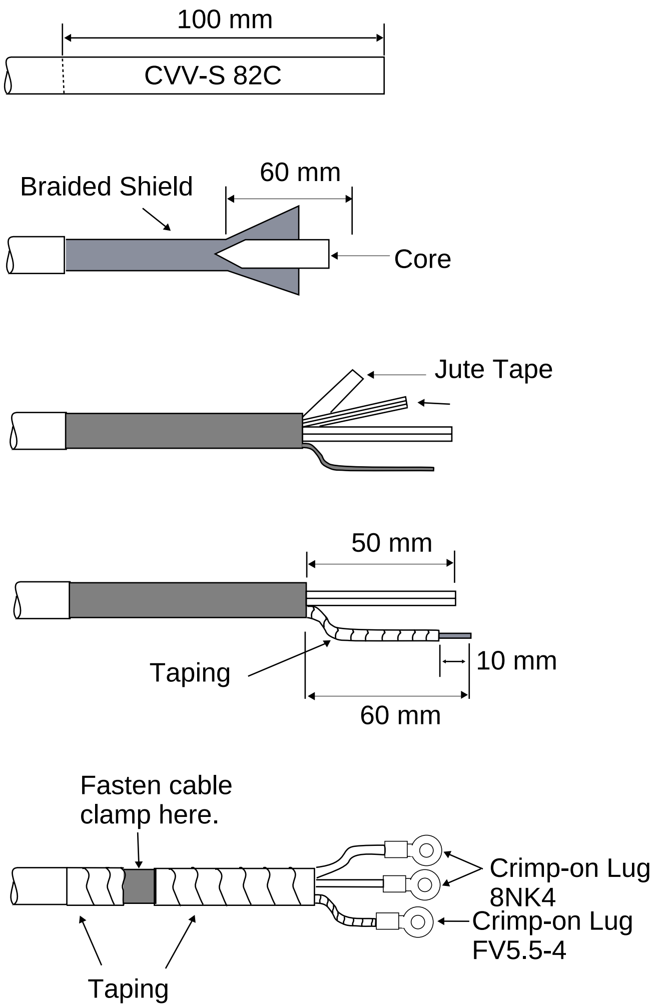


Figure 2-11 Fabricating power cable CVV-S 8 x 2C

Leading in cables to the display unit

The cable clamp may be positioned within the display unit (default arrangement), outside the display unit or at the bottom of the display unit (when using console mount, for example). When the cable clamp is located outside or beneath the display unit, use the bottom clamp front plate and bottom clamp rear plate (supplied with installation materials).

Also, use the shielding foam (supplied) to protect the noise radiation.

Cable fed from rear of display unit (Default)

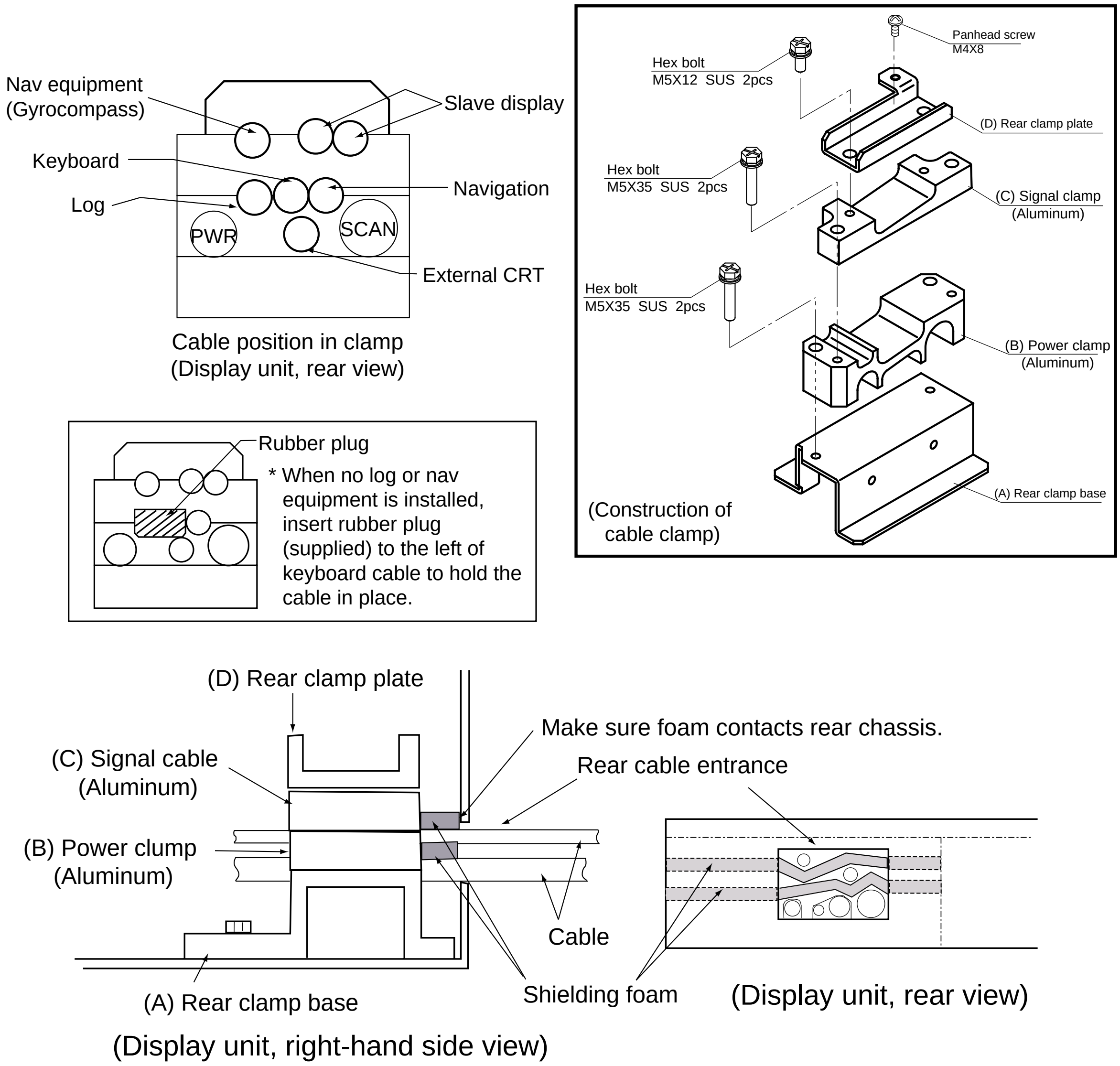


Figure 2-12 Default cable clamp position

- Place shielding foam between cables, and then attach foam to aluminum clamps.
- Fill unused clamp holes with shielding foam.

Cable fed from outside display unit

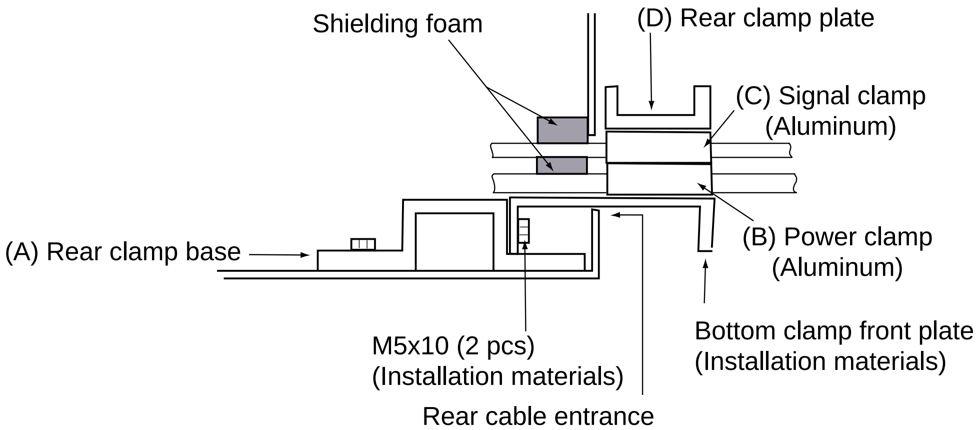


Figure 2-13 Clamp position outside display unit (display unit right side view)

- Place shielding foam between cables inside of display unit, and then attach foam to chassis.
- Fill unused clamp holes with shielding foam.

Cables fed from bottom of display unit (for console mount)

Lead in cables through the cable clamp at the rear of the console and ground their shields in the cable clamp. For signal cable, remove vinyl sheath where cable lies in cable clamp. Fasten cables with cable ties.

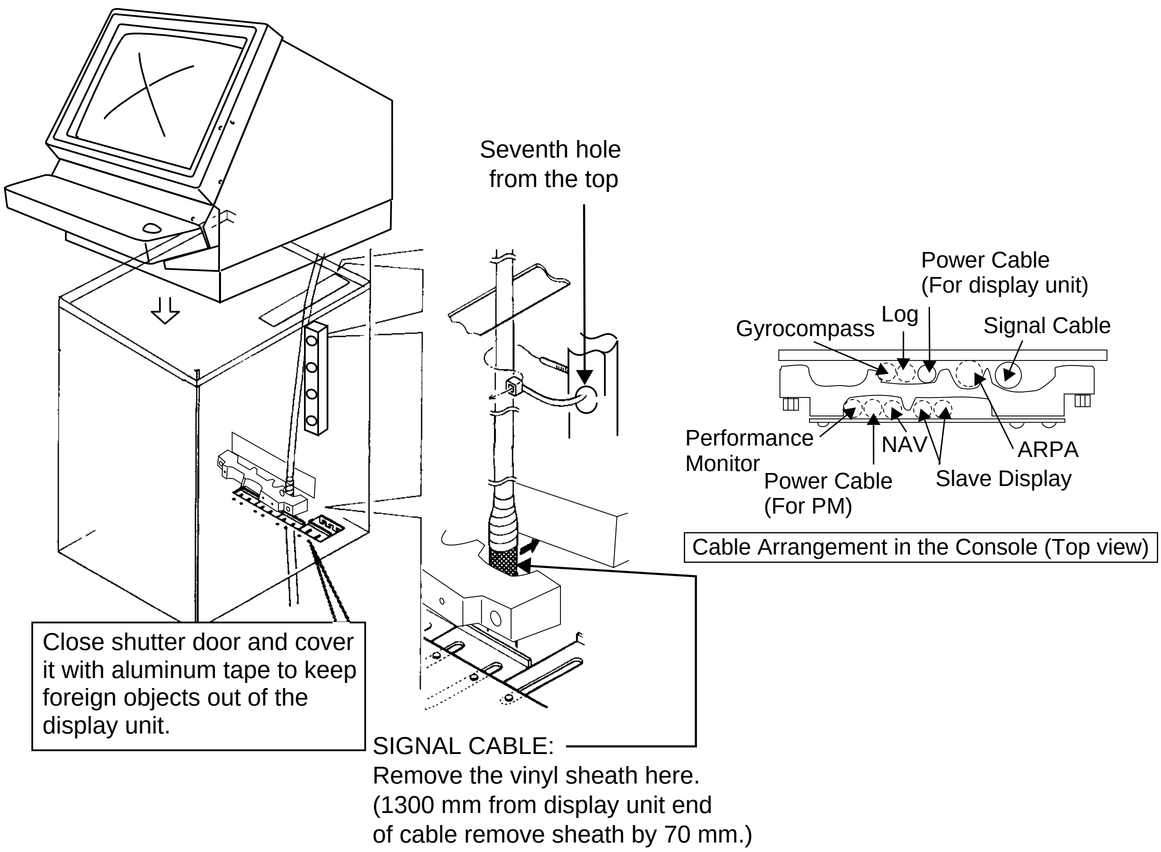
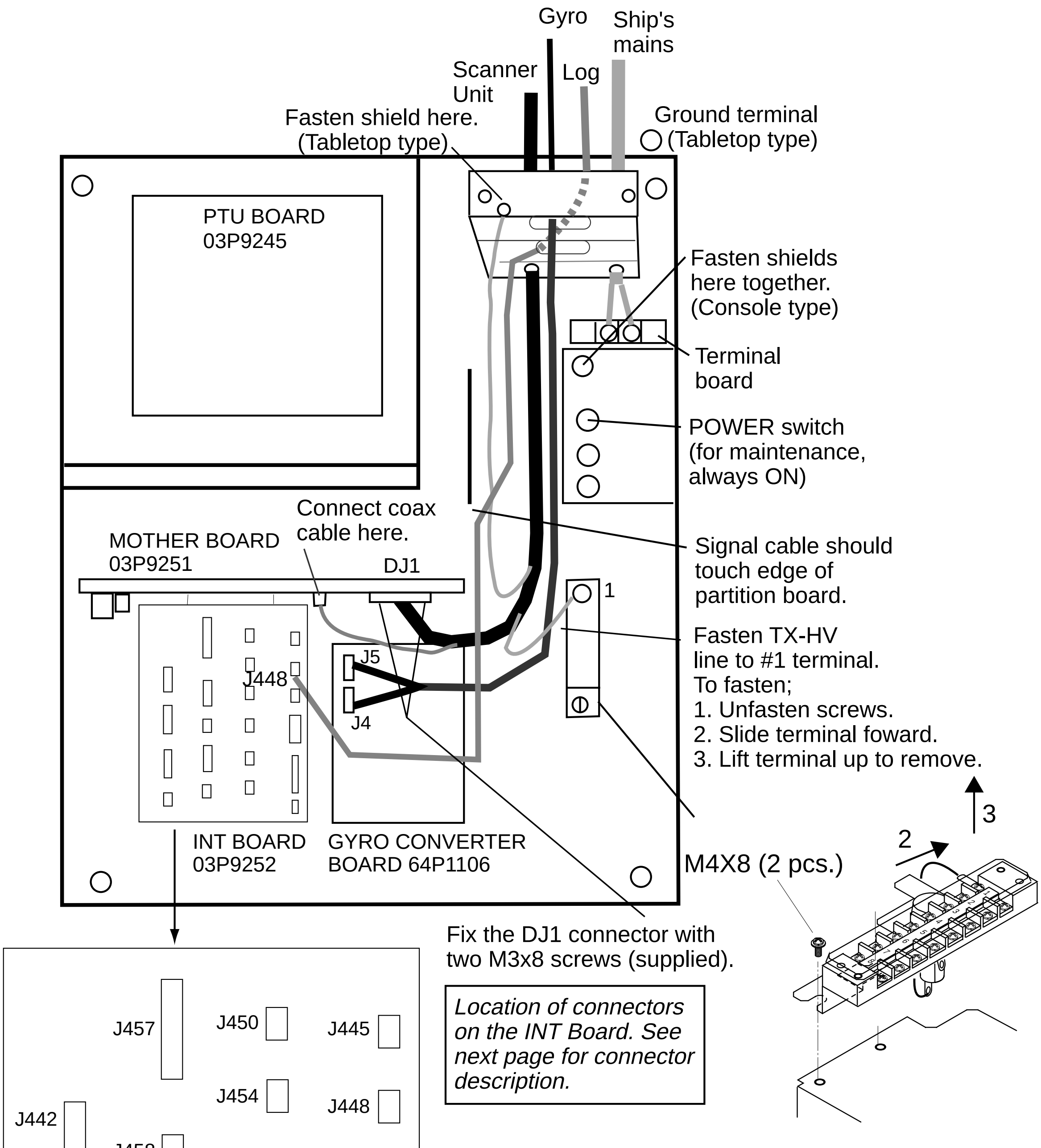
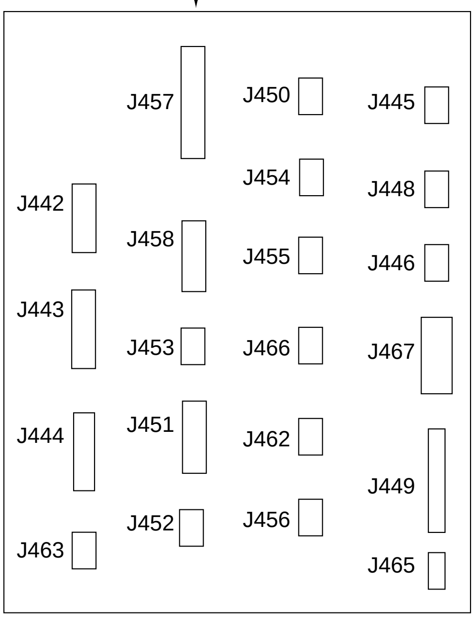


Figure 2-14 Clamp position at bottom of display unit

Connections

Open the display unit and fix it with the stay. (For procedure see page 1-5.) Remove the shield cover from the INT Board. Connect signal, power, gyro and log cables as shown below. Optional equipment are connected to the INT Board. Be sure to ground the display unit.





⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Bind the cables so as not to pinch them between the monitor and mounting base. Take special care with the high voltage line.

Figure 2-15 Display unit, inside view

Connectors on the INT Board

Table 2-1 Connectors on the INT Board

Signal name	Name on pcb	Connector no.	Connector type	Applicable equipment	Remarks
Input Signal					
Gyro signal		J4	VH, 3 pin		*: On pcb A64P1106 (option)
		J5	VH, 5 pin		
Speed log signal	LOG	J448	NH, 3 pin		200 pulses/nm, etc.
Radar buoy signal	RADAR BUOY	J445	NH, 4 pin		
Remote display signal	EXT-RADAR or RJ-7	J458	NH, 8 pin		
Output Signal					
External ARPA signal	EXT-ARPA	J444	NH, 8 pin		Heading, bearing, Tx trigger
Slave display signal	SLAVE	J442 J443	NH, 8 pin	CD-140, CD-141, GD-500, GD-500MK2, FMD-800, FMD-8010 *1 *1: Display unit for FR-2105 series radar can be used as slave display unit.	Heading, bearing, video, Tx trigger
Buzzer signal	EXT-BUZ	J451	NH, 9 pin	Speaker w/amp	Speaker signal
Monitor signal		J449	NH, 10 pin		VER synchronous, HOR synchronous, video (NTSC format)
RS-232C	RS-232C	J456	XH, 4 pin		
Analog	ANALOG	J453	NH, 3 pin		
External buzzer	EXT ALARM (AC)	J452	NH, 3 pin		
Input/Output Signal					
INS data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin		
RJ-8	RJ-8	J416	NH, 4 pin		On Mother Board 03P9251
Nav data	NAV DATA	J450	NH, 5 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		
PM_ON_OFF	PM_PRINT	J411	XH, 3 pin		On Mother Board 03P9251

Note: How to attach NH connector is shown on the next page.

How to attach NH connector

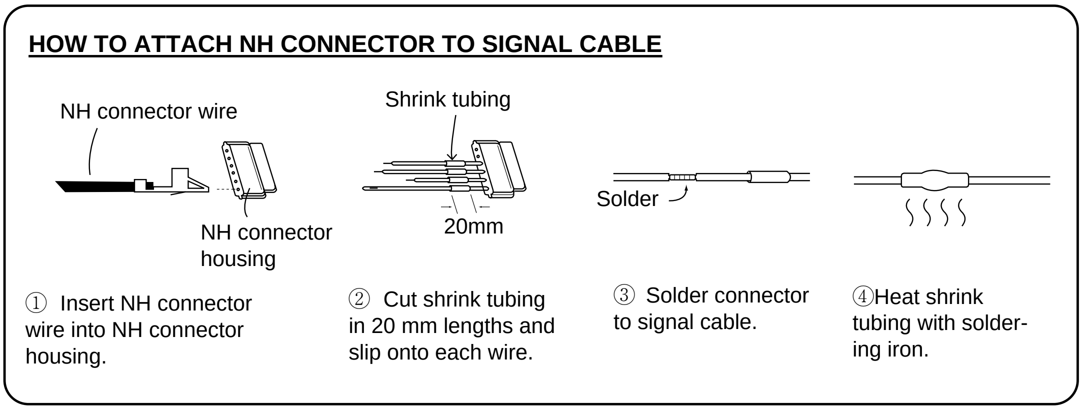


Figure 2-16 How to attach NH connector

2.3 Changing AC Power Specification

For 100 VAC or 220 VAC power, add or delete jumper wires on the PTU Board and change the power fuses inside the display unit as shown in the table below according to ship's mains. The figure below shows the location of the power fuses and the jumper wires on the PTU Board.

Table 2-2 Jumper wire setting on the PTU board, fuse rating and power specification

PCB	Power Spec.	Antenna rpm	JP1	JP2	JP3	JP4	JP91	JP92	Power Fuses
03P9245A	100/110/115 VAC	24 rpm	YES	YES	YES	NO	NO	NO	10A
03P9245C	100/110/115 VAC	42 rpm	YES	YES	YES	NO	YES	YES	
03P9245D	220/230 VAC	24 rpm	NO	NO	NO	YES	NO	NO	5A
03P9245F	220/230 VAC	42 rpm	NO	NO	NO	YES	YES	YES	

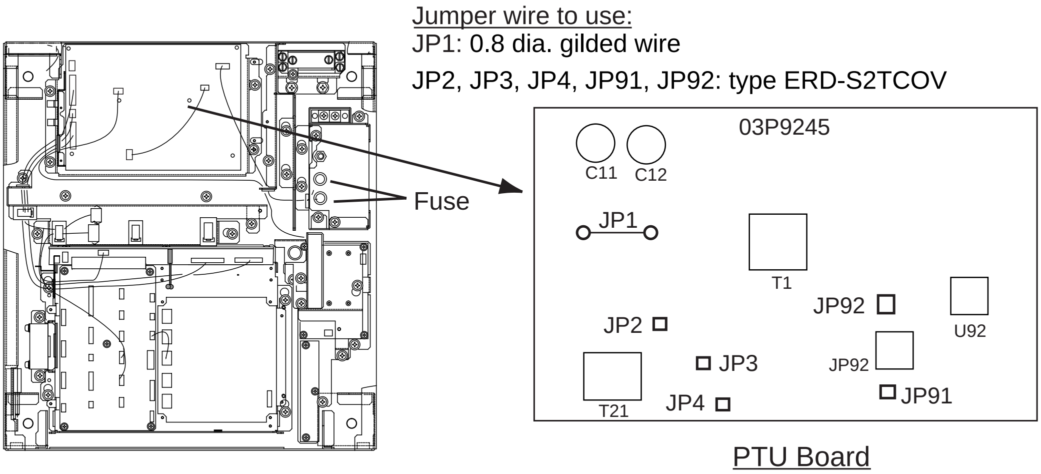


Figure 2-17 Display unit, inside view

INITIALIZATION AND ADJUSTMENT

3.1 Tuning Initialization

Tune the radar as follows: Press [RADAR MENU] [0] [0] [2] [0] [0] [0] (TUNE INITIALIZE on RADAR 3 menu) and press the [ENT] key. Also, confirm that "2. MODEL" is set to "FR-2115, 2125" on the INITIAL SETTING 4 menu, following paragraph 3.2 and then pressing [RADAR MENU], [0],[0],[0],[2],[0],[0],[0]. Trouble may result if the setting is wrong.

3.2 Accessing Menus for Initialization and Adjustment

To access them do the following:

1. Turn on the power.
2. Press the [RADAR MENU] key five times while pressing and holding down the [HL OFF] key. A beep sounds to confirm operation.

Restoring default settings

1. Press [RADAR MENU] [0] [0] [0] [2] [0] [0] [0] to display the INITIAL SETTING 4 menu.
2. Press the [0] key to select FACTORY DEFAULT.
3. Press the [ENTER] key five times, and turn the power off and on again.
4. "Initializing" appears during restoring. It takes about 90 seconds to restore the default settings, after which the normal display appears. Confirm that "2. MODEL" is set to "FR-2115,2125" on the INITIAL SETTING 4 menu.

3.3 Adjusting Video Signal Level

When the signal cable is very long, the video amplifier input level decreases, shrinking target echoes. To prevent this, confirm (and adjust if necessary) video amplifier input level.

1. Connect an oscilloscope to TP6 on the INT Board (03P9252) in the display unit.
2. Transmit on the 12 nm range.

3. Adjust R21 on the INT Board so the value of TP6 is 4 Vpp. (For remote display, adjust R134 on the INT Board.)

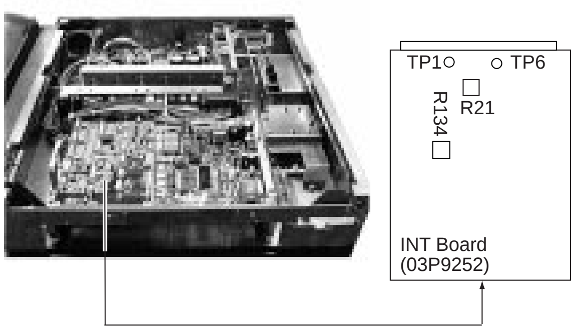


Figure 3-1 Display pedestal

3.4 Heading Alignment

You have mounted the scanner unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading line (zero degrees).

In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the scanner unit. The following adjustment will compensate for this error.

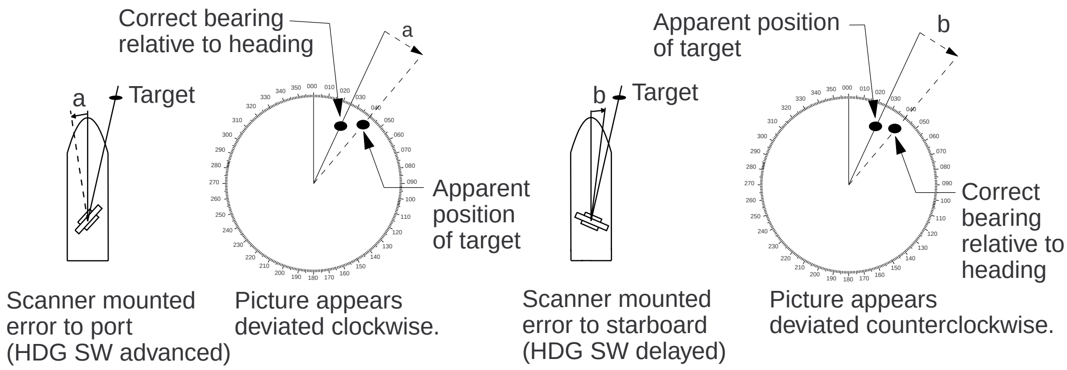


Figure 3-2 Heading alignment

1. Press [RADAR MENU] [0] [0] [0] [2] [2] to select HL ALIGN on the INITIAL SETTING1 menu.
2. Select a target echo (by gyrocompass, for example) at a range between 0.125 and 0.25 nm, preferably near the heading line.
3. Operate the EBL control to bisect the target echo with the heading line. (The value shown on the display is scanner position in relation to ship's bow.)
4. Press [ENTER] to finish.

3.5 Adjusting Sweep Timing

Sweep timing differs with respect to the length of the signal cable between the scanner unit and the display unit. Adjust sweep timing at installation to prevent the following symptoms:

- The echo of a "straight" target (for example, pier), on the 0.25 nm range, will appear on the display as being pulled inward or pushed outward. See Figure 3-3.
- The range of target echoes will also be incorrectly shown.

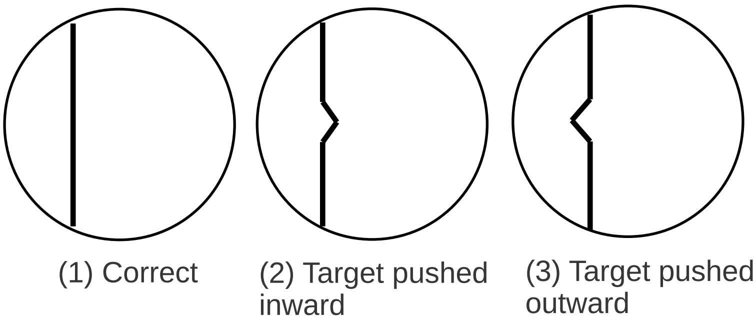


Figure 3-3 Examples of correct and incorrect sweep timings

1. Turn on the power. Press [RADAR MENU] [0] [0] [0] [2] [3] to select TIMING ADJ on the INITIAL SETTING1 menu.
2. Transmit on the 0.25 nm range.
3. Adjust radar picture controls to display picture properly.
4. Select a target echo which should be displayed straightly.
5. Adjust the VRM control to straighten the target echo.
6. Press [ENTER].

3.6 Suppressing Main Bang

If main bang appears at the screen center, suppress it as follows.

1. Turn on the power. Transmit on a long range and then wait ten minutes.
2. Adjust [GAIN] control to show a slight amount of noise on the display.
3. Select the 0.25 nm range. Adjust the [A/C SEA] control to suppress sea clutter.
4. Press [RADAR MENU] [0] [0] [0] [2] to open the INITIAL SETTING1 menu.
5. Press [7] to select 7.MBS.
6. Adjust the VRM control to adjust timing; the EBL control to adjust level.
7. Press [ENTER].

3.7 Confirming Magnetron Heater Voltage

Magnetron heater voltage is adjusted at the factory. However, confirm that it is within the prescribed rating.

Table 3-1 Magnetron heater voltage rating

Rating	FR-2115 (12 kW)	FR-2125 (25 kW)
ST-BY, 0.125 nm	7.4 V-7.6 V	8.2 V-8.4 V
TX, max range	7.4 V-7.6 V	6.5 V-7.5 V

1. Press [RADAR MENU] [0] [0] [0] [2] [0] to open the INITIAL SETTING2 menu.
2. Press [5] to select the 5. SCANNER STOPPED field and the TX option.
3. Disconnect connector P821 from the scanner unit.
4. Turn off the antenna switch in the display unit.

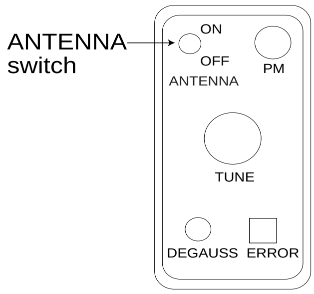


Figure 3-4 Antenna switch in tuning compartment

5. Turn off screen brilliance.
6. Measure voltage between pins #12(+) and #5(-) on connector P801 on the RFC Board (03P9243) in the scanner unit.
7. If the voltage is not within the rating shown in Table 3-2, adjust potentiometer VR1 on the RFC Board.

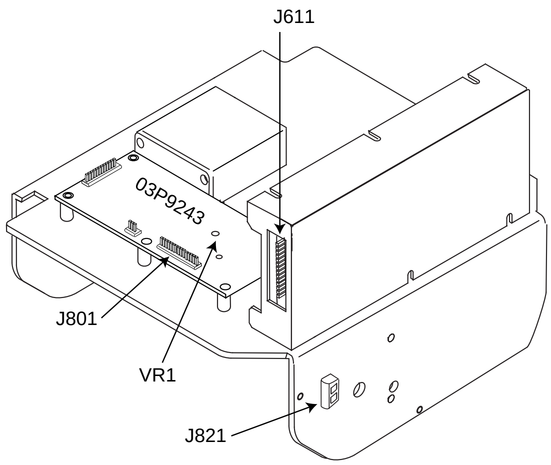


Figure 3-5 RFC Board

3.8 Initial Setting Menus

The INITIAL SETTING menus (four menus) and the OWN SHIP INFORMATION menu setup the radar according to expected usage, authorities specification, ship's characteristics, operator's preference, etc. Set items on each menu in accordance with regulations/operator's preference. After entering initial settings, reset the power.

Press [RADAR MENU] [0] [0] [0] [2]

[INITIAL SETTING 1]

1 [FUNCTIONS(4)]	
2 HL ALIGN	
	EBL 0.0°
3 TIMING ADJ	
	VRM 00.00
4 ANT HGT	5m/7m/10m/15m/ 20m/30m/MORE
5 LOG PULSE	200P/NM
6 [OWN SHIP INFORMATION]	
7 MBS	MBS TIMING VRM 0 MBS LEVEL EBL 0
8 ON TIME	000000.0H
9 TX TIME	000000.0H
0 [INITIAL SETTING(2)]	

Press [6]

[OWN SHIP INFORMATION]

1 [INITIAL SETTING(1)]	
2 SHIP'S LENGTH	000m
3 SHIP'S WIDTH	00m
4 RADAR POSN	FOR BOW 000m FOR PORT 00m
5 NAV ANT POSN	FOR BOW 000m FOR PORT 00m
6 TURN RATE	00KT 00.0° / s 00KT 00.0° / s
7 SPEED RATE	00KT 0.00KT/s 00KT 0.00KT/s

Press [0]

[INITIAL SETTING 2]

1 [INITIAL SETTING(1)]	
2 LOG GYRO INPUT	LOG PULSE/SERIAL DATA GYRO AD10/SERIAL DATA
3 OWN SHIP VECTOR	COMPASS/COURSE
4 KEY BEEP	ON/OFF
5 SCANNER STOPPED	ST-BY/TX
6 VIDEO SIG	ANALOG/DIGITAL
7 ALARM LEVEL	4/5/6/7
8 DISPLAY	MAIN/SUB
9 SECTOR BLKG	OFF/ON 000° → 000° 000° → 000°
0 [INITIAL SETTING(3)]	

Press [0]

[INITIAL SETTING 3]

1 [INITIAL SETTING(2)]	
2 TRAILS RESTART	OFF/ON
3 ECHO AVG W/O GYRO	OFF/ON
4 HEAD UP TB SCALE	DEG/16POINT
5 CTR ECHO STRETCH	OFF/ON
6 VIDEO CONTRAST	1/2/3
7 MAXIMUM RANGE	72/96/120
8 ECHO FULL COLOR *1	OFF/ON
9 INDEX LINES	2/3/6
0 [INITIAL SETTING(4)]	

Press [0]

[INITIAL SETTING 4]

1 [INITIAL SETTING(3)]	
2 MODEL	FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND
3 TYPE	R/N/G/W
4 CTR STC CURVE	L/M/H
5 RJ-7	OFF/ON
6 RJ-8	OFF/ON ANT A FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND ANT B FR-2115, 2125/ OTHER X-BND/ FR-2165DS, 2135SW/ OTHER S-BND
7 SHIP'S TYPE *1	DEEP SEA/FISHING/ LONG LINE FISHING
8 RANGE UNIT *1	NM/KM/SM
9 CABLE LENGTH	500m/5000m
0 FACTORY DEFAULT *2	

*1 For merchant vessel the settings are DEEP SEA, NM, COLOR.
*2: For factory use.

INITIAL SETTING1 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2]

HL ALIGN: Aligns heading.

TIMING ADJ: Adjusts sweep timing.

ANT HGT: Enter height of scanner above water. Select from 5 m, 7 m, 10 m, 15 m, 20 m, or more than 30 m.

LOG PULSE: Enter speed log's pulse rate.

OWN SHIP INFORMATION: Enter ship's characteristics; length, width, radar scanner position, navigation antenna position, turn rate, and speed rate. See the description on the next page for further details.

MBS: Suppresses main bang.

ON TIME, TX TIME: Shows number of hours the radar has been turned on and transmitted, respectively. Value can be changed.

INITIAL SETTING2 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0]

LOG GYRO INPUT: Select LOG or GYRO input type. LOG: Select pulse or serial data. GYRO: Digital from A/D converter or serial data.

OWN SHIP VECTOR: Select reference for own ship vector; compass or course.

KEY BEEP: Turns key response beep on or off.

SCANNER STOPPED: Set to ST-BY in normal use. TX enables transmission state without scanner rotation.

VIDEO SIG: Set to ANLG (analog) for normal use. Select DIGITAL to adjust QV (Quantized Video).

ALARM LEVEL: Sets echo strength which triggers guard alarm. "7" is strongest echo; "4" is medium strength echo.

DISPLAY: Select radar display function; main or sub (slave).

SECTOR BLKG: Sets area (up to 2) where no radar pulses will be transmitted. For example, set the area where an interfering object at the rear of the scanner would produce a dead sector (area where no echoes appear) on the display. To enter an area, select ON and enter relative bearing range of the area.

INITIAL SETTING3 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0] [0]

TRAILS RESTART: Selects whether to restart or discontinue target trails when changing the range. ON restarts trailing on newly selected range; OFF discontinues trails.

ECHO AVG W/O GYRO: Echo averaging can be turned on without gyrocompass connection.

HEAD UP TB SCALE: Bearing scale may be shown in degrees or compass points in the head-up mode.

CTR ECHO STRETCH: Turn on to enlarge echoes in the range up to the first range ring.

VIDEO CONTRAST: For factory use. Do not change setting.

MAXIMUM RANGE: For factory use. Do not change setting.

ECHO FULL COLOR: Echoes may be displayed in one color or multi-color. Select ON for multi-color display.

INDEX LINES: Selects the number of index lines to display; 2, 3, or 6.

INITIAL SETTING4 menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [0] [0] [0]

MODEL: Selects radar model.

TYPE: Selects specification of radar. Select R for R type; G for IMO type N for Netherland type, W for Washington ferry.

CTR STC CURVE: Selects level of STC affect; Low, Medium or High.

RJ-7, RJ-8: Selects which Interswitch unit to use.

SHIP'S TYPE: Select class of vessel; deep sea, fishing, long line fishing.

CABLE LENGTH: Set for "500."

FACTORY DEFAULT: Restores all menus' default settings.

OWN SHIP INFORMATION menu

Keying sequence: [RADAR MENU] [0] [0] [0] [2] [6]

SHIP'S LENGTH: Enter ship's length.

SHIP'S WIDTH: Enter ship's width.

RADAR POSN: Enter distance from both bow and port to the radar antenna location.

NAV ANT POSN: Enter distance from both bow and port to the navigation antenna location.

TURN RATE: Enter ship's turn rate.

SPEED RATE: Enter ship's speed rate.

INSTALLATION OF OPTIONAL EQUIPMENT

4.1 Gyro Converter GC-8

The Gyro Converter GC-8, incorporated inside the radar display unit, converts analog gyrocompass reading into digital coded bearing data for display on the radar display.

This section explains how to install and setup the GC-8 (mainly consisting of the GYRO CONVERTER Board) and set it up according to gyrocompass connected.

Installation and connection of the GYRO CONVERTER Board

Necessary Parts: GC-8-2 (008-446-520)

Name	Type	Qty	Code No.
Gyro Converter Board	64P1106	1	004-412-220
Screws	M3x8, C2700W	5	000-881-404
Sticker	64-014-20211	1	100-132-701

1) Turn off the power.
2) Open the display unit. See Chapter 1 for instructions.
3) Fasten the GYRO CONVERTER Board inside the display unit with four washerhead screws (supplied).

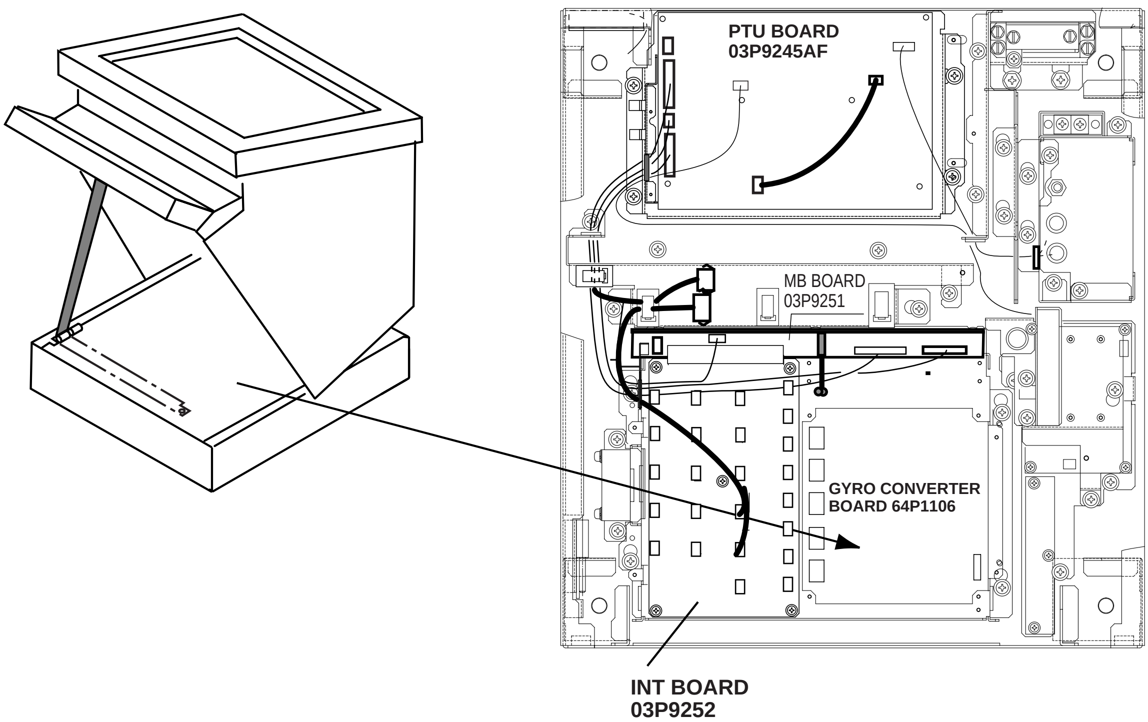
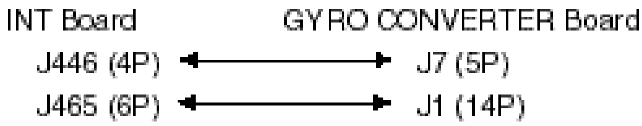


Figure 4-1 Display unit, inside view

4) Connect the GYRO CONVERTER Board to the INT Board (cables supplied with GC-8) as shown below.



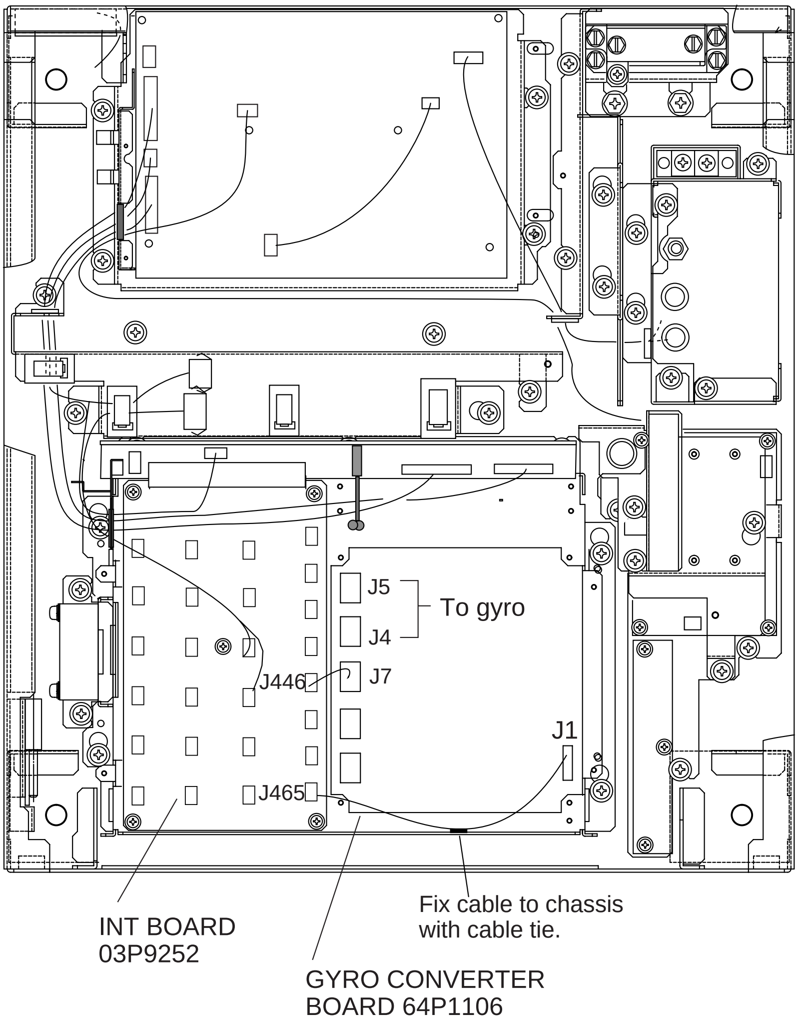


Figure 4-2 Display unit, inside view

5) Confirm gyrocompass specifications and set up the DIP switches and jumper wires on the GYRO CONVERTER Board according to gyrocompass connected:

- Setting jumper wires and DIP switches by gyrocompass specifications: page 4-3
- Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-5
- Location of jumper wires and DIP switches: page 4-6

6) Solder the gyrocompass cable to the VH connector assemblies (supplied).

7) Attach instruction label (supplied) to the shield cover for the INT and GYRO CONVERTER boards.

8) Close the display unit.

9) Turn the power off and on to reset the CPU.

Connection of external power supply

An external power supply is necessary when the repeater signal is step-by-step type and the step voltage is below 20V or output voltage is less than 5 W.

1. Cut jumper wire JP1 on the GYRO CONVERTER Board when an external power supply is used.
2. Connect gyro cable and power cable as shown below.

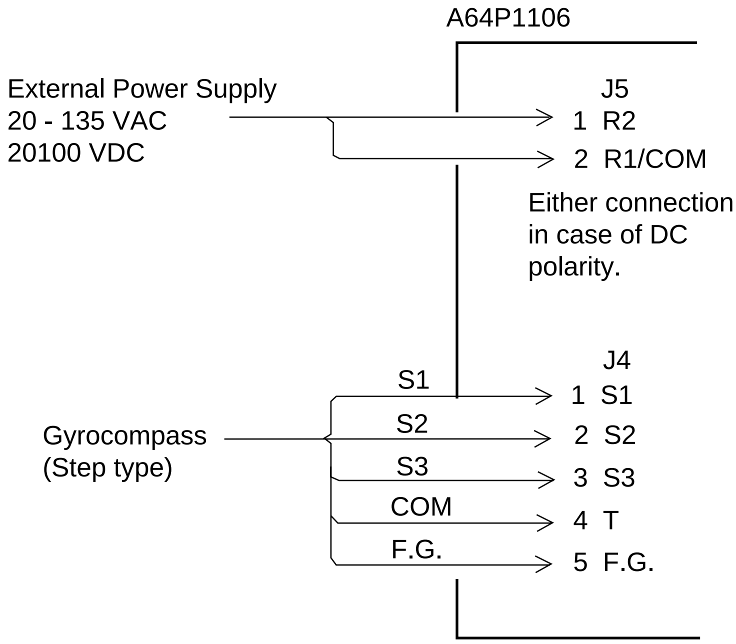


Figure 4-3 Connection of external power supply to GYRO CONVERTER Board

DIP switch, jumper wire settings

Default setting

The default setting of all DIP switches is off and all jumpers wire are set to “#1.” (Note that jumper wire JP1 is set at #1, #2, and #3.) In those settings the gyrocompass having the following characteristics can be directly connected; modification of the GYRO CONVERTER Board is not necessary.

AC synchronous signal: 50/60 Hz
Rotor voltage: 60 V to 135 V AC
Stator voltage: 60 V to 135 V AC
Gear ratio: 360x
Supply voltage: 30 V to 135 V AC

If the specifications of the gyrocompass differ from those mentioned above, change jumper wire and DIP switches settings on the GYRO CONVERTER Board. Settings may be changed according to gyrocompass specifications or make and model of gyrocompass (see page 4-5). For the location of DIP switches and jumper wires, see page 4-6.

Setting method 1: by gyrocompass specifications

1) Gyrocompass type

Gyrocompass type	SW 1-4	SW 1-5	SW 1-6	JP1
AC synchronous	OFF	OFF	OFF	#1, #2, #3
DC synchronous	OFF	OFF	OFF	#2, #3, #4
DC step	ON	OFF	OFF	#4, #5, #6
Full-wave pulsating current	OFF	ON	OFF	#4, #5, #6
Half-wave pulsating current	ON	ON	OFF	#4, #5, #6

2) Frequency

Frequency	SW 1-7	SW 1-8	Remarks
50/60 Hz	OFF	OFF	AC synchronous pulsating current
400 Hz	ON	OFF	AC synchronous pulsating current
500 Hz	OFF	ON	AC synchronous pulsating current
DC	ON	ON	DC synchronous DC step

3) Rotor voltage (between R1 & R2)

Rotor voltage	SW 2-1	JP3
20 V to 45 VAC	ON	#2
30 V to 70 VAC	OFF	#2
40 V to 90 VAC	ON	#1
60 V to 135 VAC	OFF	#1

4) Stator voltage (between S1 and S2)

Stator voltage	SW 2-2	SW 2-3	JP2
20 V to 45 VAC, or 20 V to 60 VDC	ON	OFF	#2
20 V to 45 VAC, or 20 V to 60 VDC	OFF	OFF	#2
40 V to 90 VAC	ON	OFF	#1
60 V to 135 VAC	OFF	OFF	#1

5) Ratio

Ratio	SW1-1	SW 1-2	SW1-3
360x	OFF	OFF	OFF
180x	ON	OFF	OFF
90X	OFF	ON	OFF
36X	ON	ON	OFF

6) Supply voltage

Supply voltage	JP4	JP5
20 V to 45 VAC, or 20 V to 60 VDC	#2	#2
30 V to 135 VAC, or 40 V to 100 VDC	#1	#1

7) AD-10 format data Tx interval

Select data transmitting interval for ports 1 to 6 by jumper wires JP6 and JP7. **Note:** The Tx interval is available in 25 ms or 200 ms. 25 ms is for radar; 200 ms is for all other equipment.

8) NMEA-0183 Tx interval

Tx interval	SW2-4
2 seconds	ON
1 second	OFF

Setting method 2: by make and model of gyrocompass

Maker	Models	Specification	SW 1-1	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	SW 2-1	SW 2-2	SW 2-3	JP1	JP2	JP3	JP4	JP5
FURUNO	GY-700	DC step 100V 180x 5-wire, open collector	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1
Anschutz	Standard 2,3	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1
	Standard 4,6	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#1	#1	#1
	Standard 20	DC step 35V 180x COM(-) ,3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
Yokogawa Navtec (Plaith type)	C-1/1A/2/3 A-55, B-55	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1
	CMZ-700	DC step 24V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	∗	∗
	CMZ-250X/ 300X/500	DC synchronous 360x	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	∗	∗
		DC step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2
	CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	CMZ-50 Note	step 35V 180x COM(+),3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	Remo- ve	#2	–	∗	∗
Plaith	NAVGAT II/III	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#2	#1	#1
Tokimec (Sperry type)	ES-1/2/11 GLT-101/102/ 103/106K/107	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	MK-14 MOD-1/2/T NK-EN,NK-EI	DC step 70V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	SR-130/140	DC step 70V 180x 5-wire, open collector	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203	DC step 70V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
	TG-6000	DC step 24V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	–	#2	#2
	GM-11	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	SR-120,ES-16 MK-10/20/30	DC step 35V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	#4, #5,#6	#2	–	#2	#2
Kawasaki	GX-81	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
Armabrown	MK-10,MKL-1 SERIES1351, MOD-4	DC step 50V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	OFF	OFF	#4, #5,#6	#2	–	#1	#1
Robertson	SKR-80	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	–	ON	OFF	#4, #5,#6	#2	–	#2	#2

∗ : Set JP4 and JP5 according to the voltage of the external power supply.

Note : If CMZ-50 has 35VDC , set JP1 to #4, #5, #6.

Location of DIP switches, jumper wires on the GYRO CONVERTER Board

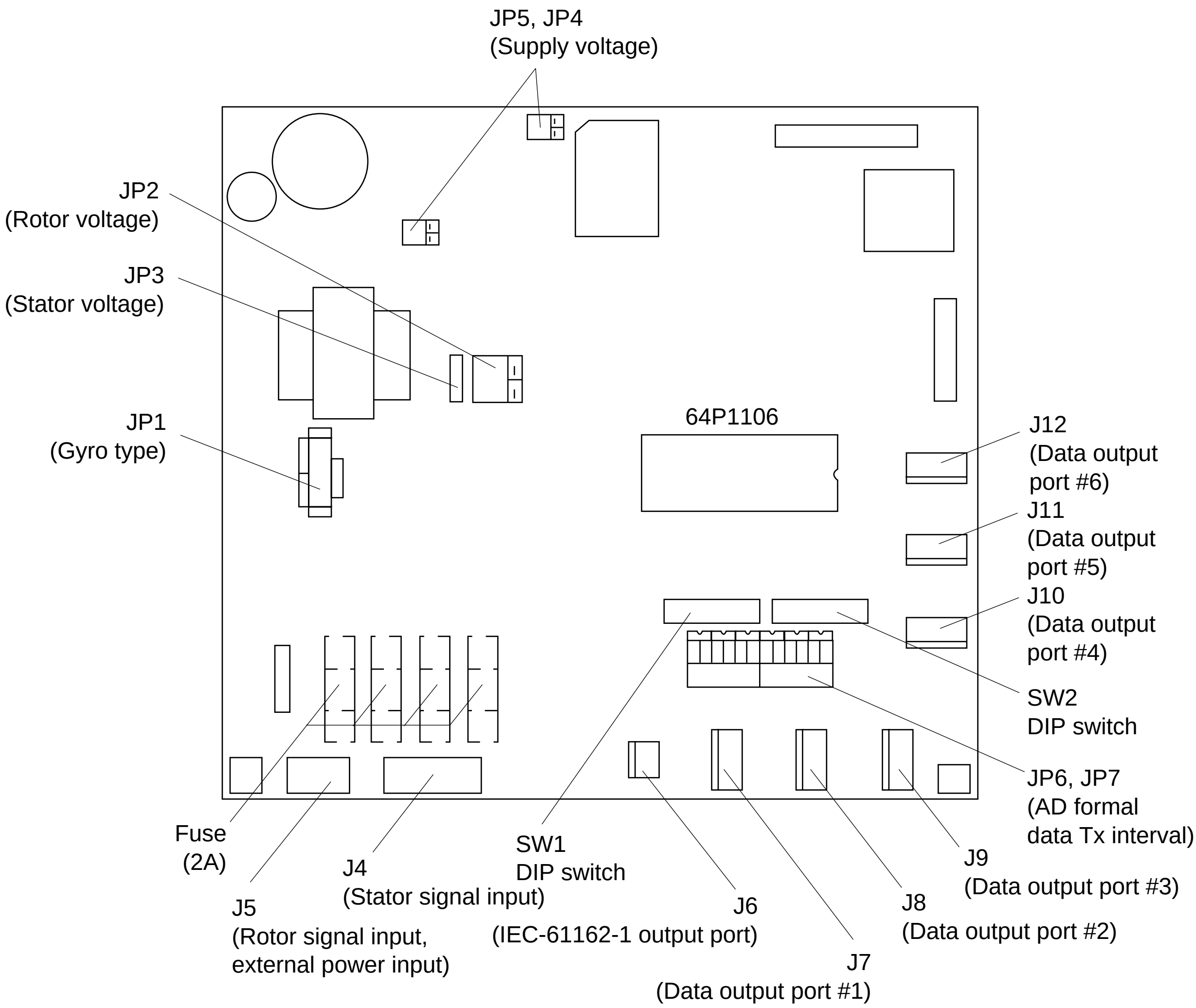


Figure 4-4 GYRO CONVERTER Board

Setting the heading readout on the radar display

Confirm that the gyrocompass is giving a reliable readout. Then, set the heading readout on the radar display with the gyrocompass readout as follows:

1. Press [RADAR MENU] to display the FUNCTIONS 1 menu.
2. Press the [0] key twice to display the FUNCTIONS 3 menu.
3. Press the [9] key to select the GYRO SETTING option.
4. Rotate the EBL control to align the radar’s HDG readout with the gyrocompass.
5. Press [ENTER] to conclude the setting.

4.2 ARP Board ARP-26

The ARP Board ARP-26, which provides ARPA functions, is an optional circuit board which is accommodated in the display unit of the FR-2105 series radar.

Necessary Parts: ARP-26-2E (008-485-500)

Name	Type	Qty	Code no.
ARP board	18P9002B	1	008-473-650

Installation of the ARP board

1. Remove the bottom cover of the display unit by unfastening four screws.
2. Set the ARP Board in the center slot of the PCB card case.

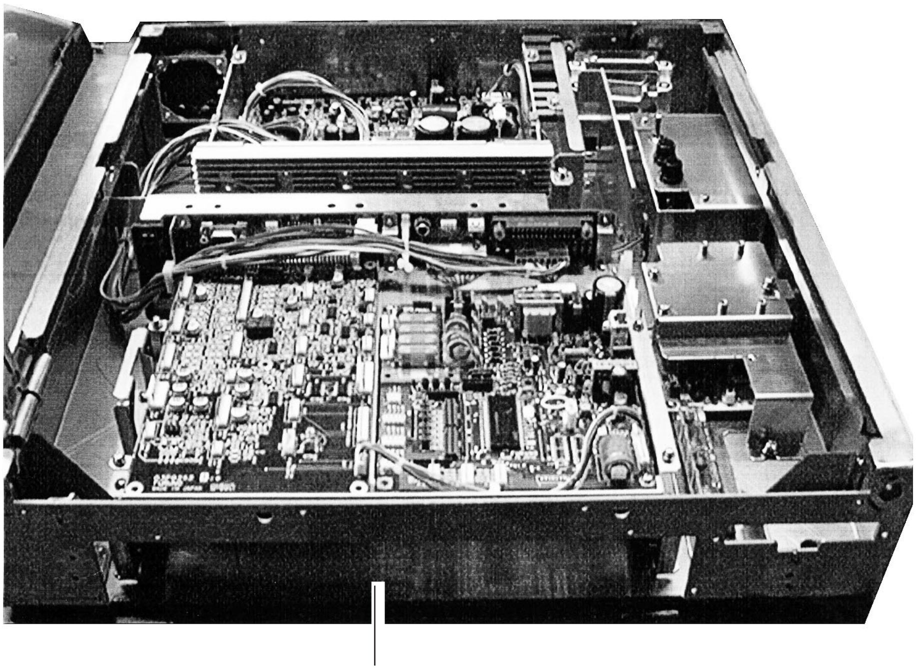


Figure 4-5 Display pedestal inside view

3. Adjust the ARP referring to the procedure on the next page.

ARP board adjustment

1. Turn the GAIN, A/C SEA and A/C RAIN controls fully counterclockwise, and then transmit on the 12 nm range.
2. Connect a digital multimeter between TP7(+) and TP6(-) on the ARP Board.

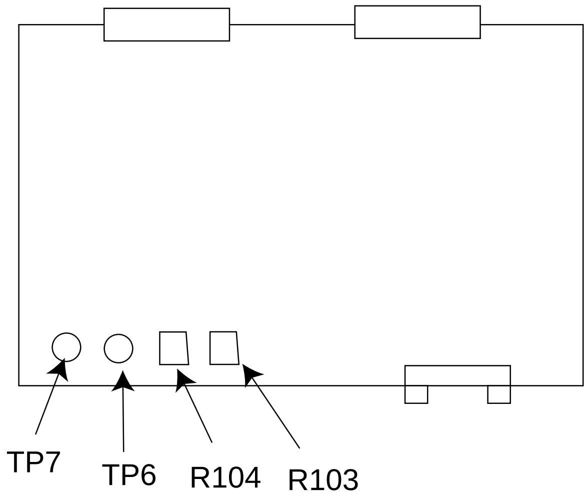


Figure 4-6 ARP Board (18P9002B)

3. Adjust R104 on the ARP Board so the multimeter reads between 0.09 and 0.14 VDC.
4. Set controls and switches as below.

   GAIN: fully clockwise (max.)
   Interference rejector: OFF
   Range: 24 nm
   Echo stretch: OFF

5. Press [RADAR MENU] [0] [0] [0] [0] open the INITIAL SETTING3 menu.
6. Set the VIDEO SIG field to DIGITAL and press [ENTER].
7. Adjust R103 on the ARP Board so noise just appears on the display.

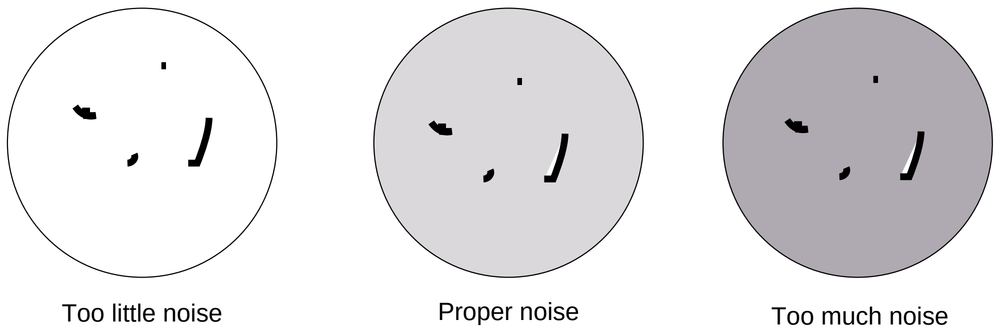


Figure 4-7 How to adjust noise

8. Set VIDEO SIG to ANALOG and press [ENTER].

Final check

Connect a gyrocompass and a log to the radar and place the radar under transmit state. Confirm that LEDs CR9, CR10, CR11, CR12, CR15 and CR16 on the ARP Board are off. If ship's speed is zero, or other signal is not being input, corresponding LED will light.

#4	#3	#2	#1
OFF	OFF	OFF	OFF

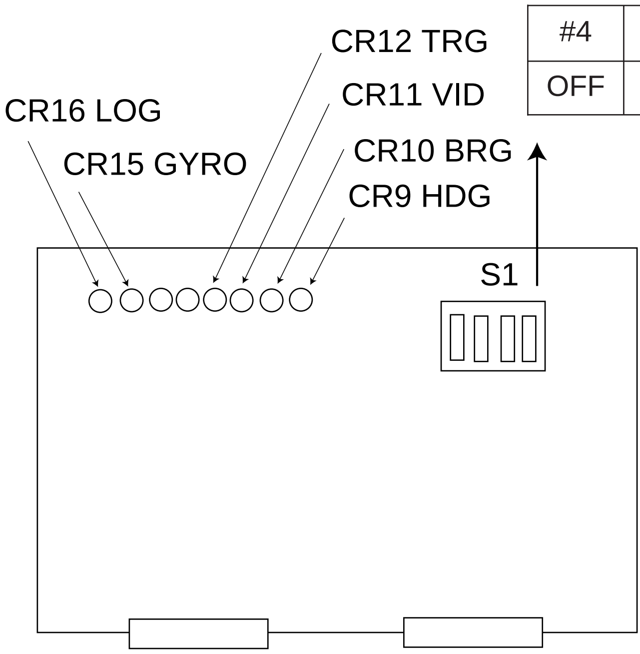


Figure 4-8 ARP Board ARP-26

4.3 RP Board RP-26

The RP Board RP-26, which providesvideo plotter functions, consists of a circuit board and a card drive both of which are accommodated in the display unit of the FR-2105 series radar.

Table top/console type

Necessary Parts: RP-26-T-2E (008-485-520)

Name	Type	Qty	Code no.
RP board	14P0298	1	008-487-640
Card case assy.	–	1	–
Panhead screw B	M4x8 C2700W	4	000-881-445
Panhead screw B	M3x8 C2700W	2	000-881-404
Panhead screw A	M2.6x5 C2700W	2	000-800-973
Teethed lock washer (Outside teeth)	M4 C5191W	1	000-864-506
Cable assy.	HIF6-100D-A-A-52	1	000-137-553

1. Lift the monitor and fix it with the stay. Refer to Chapter 1 for instructions.
2. Remove the right arm cover from the control head.
3. Fasten the card case to the right arm cover as follows:
   a) Fasten the ground wire with an M4x10 screw and washer (supplied) as shown below.
   b) Fasten the arm cover to the card case with three M4x8 screws (supplied).

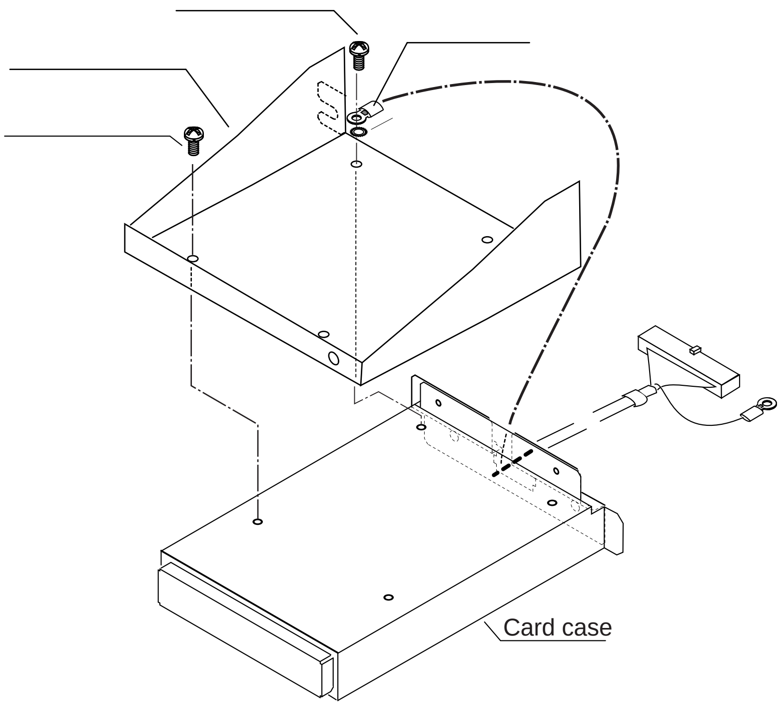


Figure 4-9 Fastening the card case to the right arm cover

4. Unfasten the front panel from the display pedestal.
5. Pass the connector from the card case through the hole in the display pedestal.

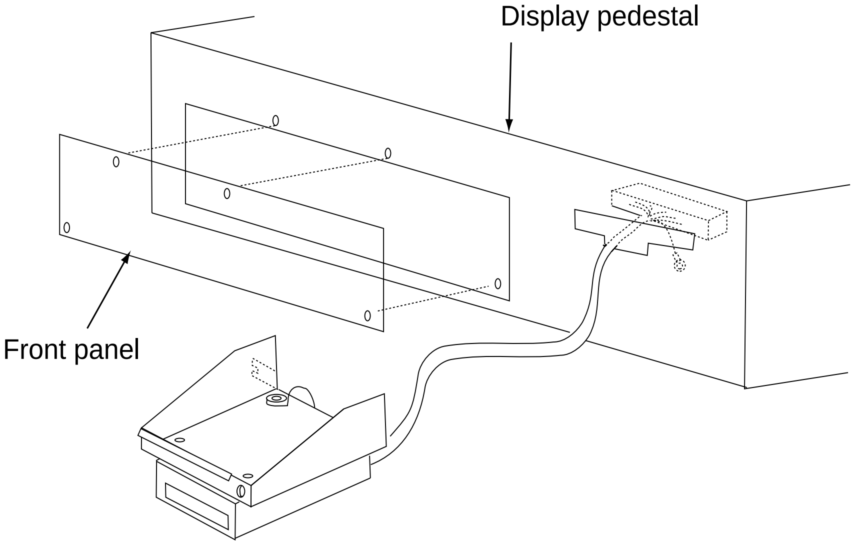


Figure 4-10 Display pedestal

6. Set the RP Board (14P0298) in the top slot of the pcb card case. See page 4-7 for the location of the pcb card case.
7. Run the connector from the card case in front of the GYRO CONVERTER Board.
8. Plug the connector in J1 on the RP Board.
9. Fasten the ground wire from the connector at the location shown below.

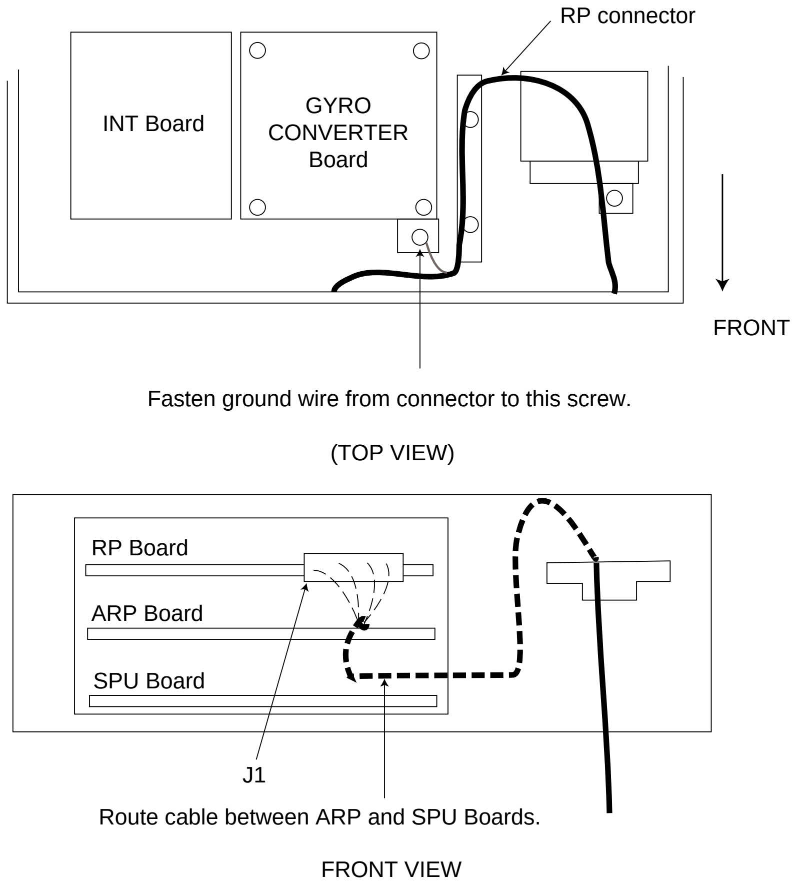


Figure 4-11 Display pedestal, top view

10. Fasten the front panel on the display pedestal.
11. Retract the stay to close the display unit.
12. Fasten the right arm cover.

Separate type control head

Necessary parts: RP-26-Z-2E (Code no. 008-491-400)

Name	Type	Qty	Code No.
Card Case Assy.	–	1	–
RP Board	14P0298	1	008-487-640
Pan Head Screw B	M4x8 C2700W	1	000-881-445
Pan Head Screw B	M3x8 C2700W	2	000-881-404
Pan Head Screw A	M2.6x5 C2700W	2	000-800-973

1. Lift the monitor. See Chapter 1 for instructions.
2. Fasten the mounting base with one M4 x 8 screw as below.

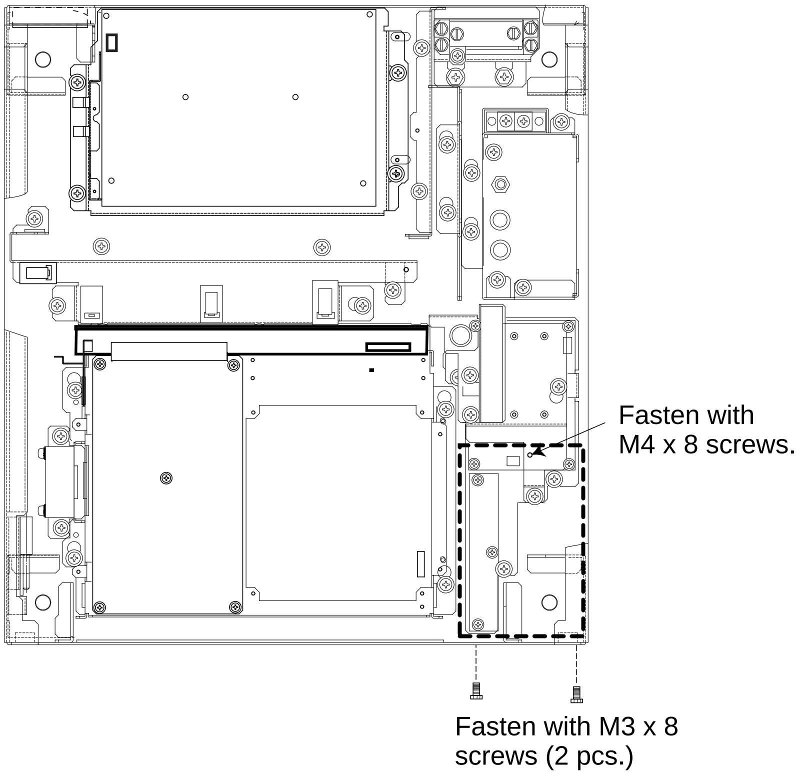


Figure 4-12 Display unit, inside view

3. Fix the mounting base to front panel with two M3 x 8 screws.
4. Set the M-card case lid to the hole in the front panel and fix with two M2.6 x 5 screws.

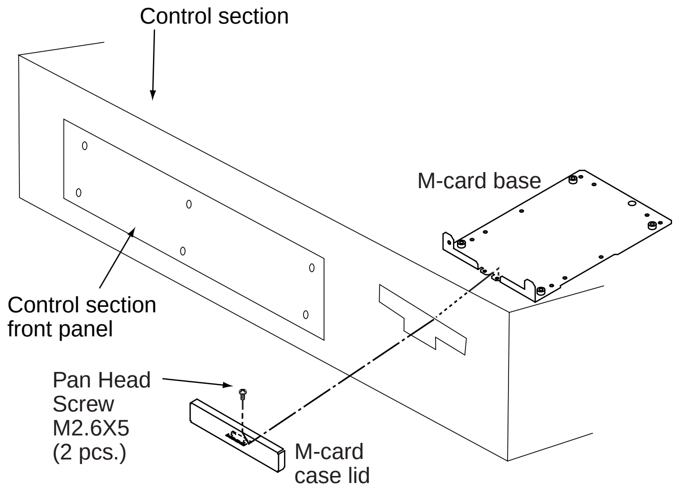


Figure 4-13 Display pedestal, front view

5. Loosen six screws to remove the front panel on the display pedestal.
6. Set the RP Board (14P0298) in the top slot of the pcb card case.
7. Run the connector from the card case in front of the GYRO CONVERTER Board.
8. Plug the connector in J1 on the RP Board.
9. Fasten the ground wire from the connector at the location shown below.

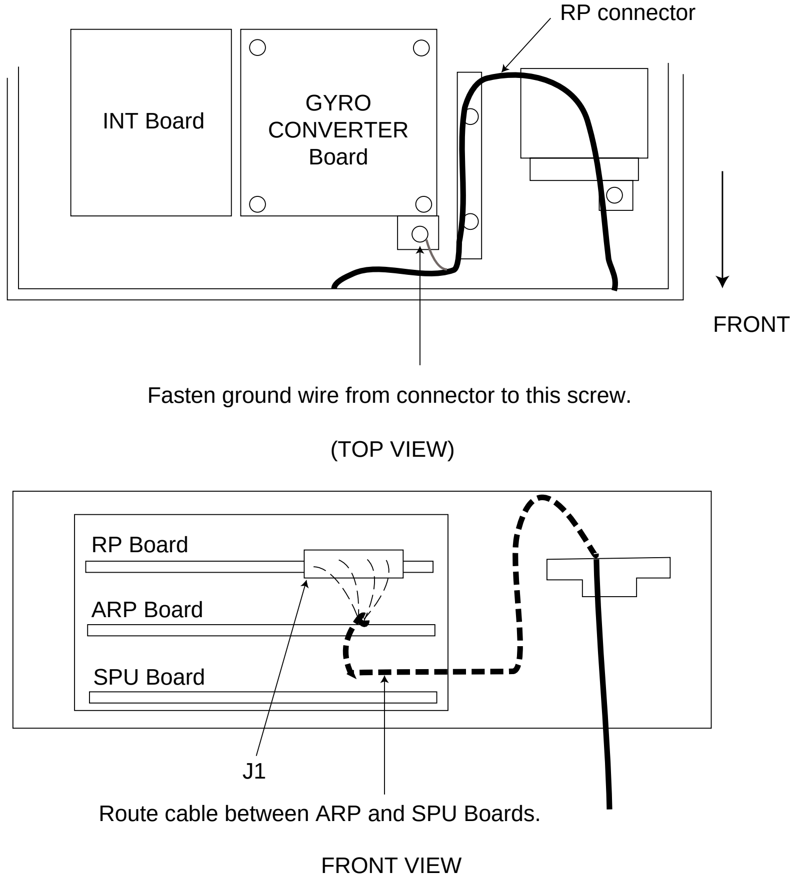


Figure 4-14 Display pedestal, top view

10. Fasten the front panel of the display pedestal.
11. Fasten the ground wire to the location shown in Figure 4-14.
12. Close the monitor.

4.4 Performance Monitor PM-30

Necessary parts: PM-30 and OP03-150 (Code no. 008-485-490)

Name	Type	Qty	Code No.
PM Board	03P9225	1	008-487-620
Pan Head Screw	M3x8 C2700W	3	000-881-404
Connector Assy.	VH3P-L300-AA	2	000-141-014

1. Lift the monitor. See Chapter 1 for instructions.
2. Fasten the PM Board 03P9225 to the location shown below with three screws (M3 x 8).

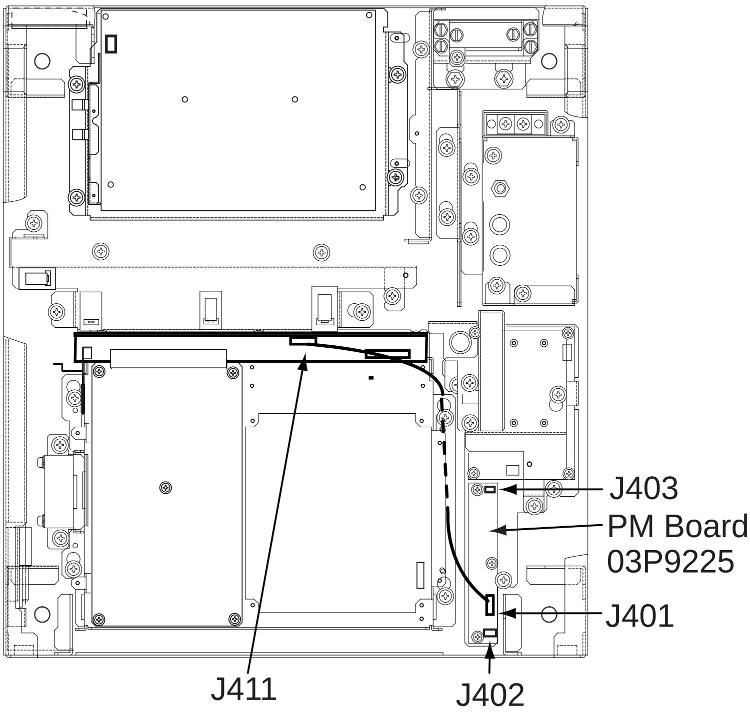


Figure 4-15 Display unit, inside view

3. Connect the connector P401 coming from J411 to J401 on the PM Board.
4. Connect two connector assemblies (VH3P-L300-AA) to J402 and J403.
5. Solder the other end of there connector assemblies with external cables, one from ship’s mains and one from the PM-30.
6. Close the monitor.

4.5 Alarm Kit

Necessary parts: OP03-156 (Code no. 008-500-650)

The alarm kit mainly consists of a circuit board and connection cables, and provides alarm output to ship's bridge alarm system.

Contents of Alarm Kit OP03-156

Name	Type	Code No.	Qty
ALARM Board	03P9262	008-500-680	1
NH Connector Assy.	03-1990(9-9P)	008-500-700	1
NH Connector Assy.	03-1991(3P)	008-500-710	4
Cable Band	HP-3N	000-570-001	1
Cable Tie	CV-100	000-570-322	3
Pan-head Screw B	M3X8 C2700W	000-881-404	4
Pan-head Screw B	M4X12 C2700W	000-881-447	1

Procedure

Refer to the figure below for parts locations.

1. Raise the monitor and fix it with the stay. (See page 1-5 for instructions.)
2. Unfasten four screws to dismount the shield cover for the INT Board.
3. Fasten the ALARM Board to the display unit with four pan-head screws (M3X8, supplied).
4. Connect the NH connector (9-9P, supplied) between J471 on the ALARM Board and J451 (EXT-BUZ) on the INT Board, passing it through the cable band and binding it with existing cable tie.
5. Fasten the cable band (supplied) with a pan-head screw (M4X12, supplied) and attach two cable ties (CV-100, supplied).
6. Connect an NH connector (3P, supplied) to each of J472, J473, J474 and J475 on the ALARM Board.
7. Route the NH connectors along the cables ties and pass them through the cable clamp. Fasten the shield cover removed at step 1.
8. Close the INT board cover.
9. Close the monitor.
10. Connect NH connectors to ship's bridge alarm system:

    J472: ARPA guard zone; target alarm
    J473: SYSTEM FAILURE (HP, BP, TRIG, VIDEO, GYRO, AZI)
    J474: ARPA CPA/TCPA
    J475: Spare

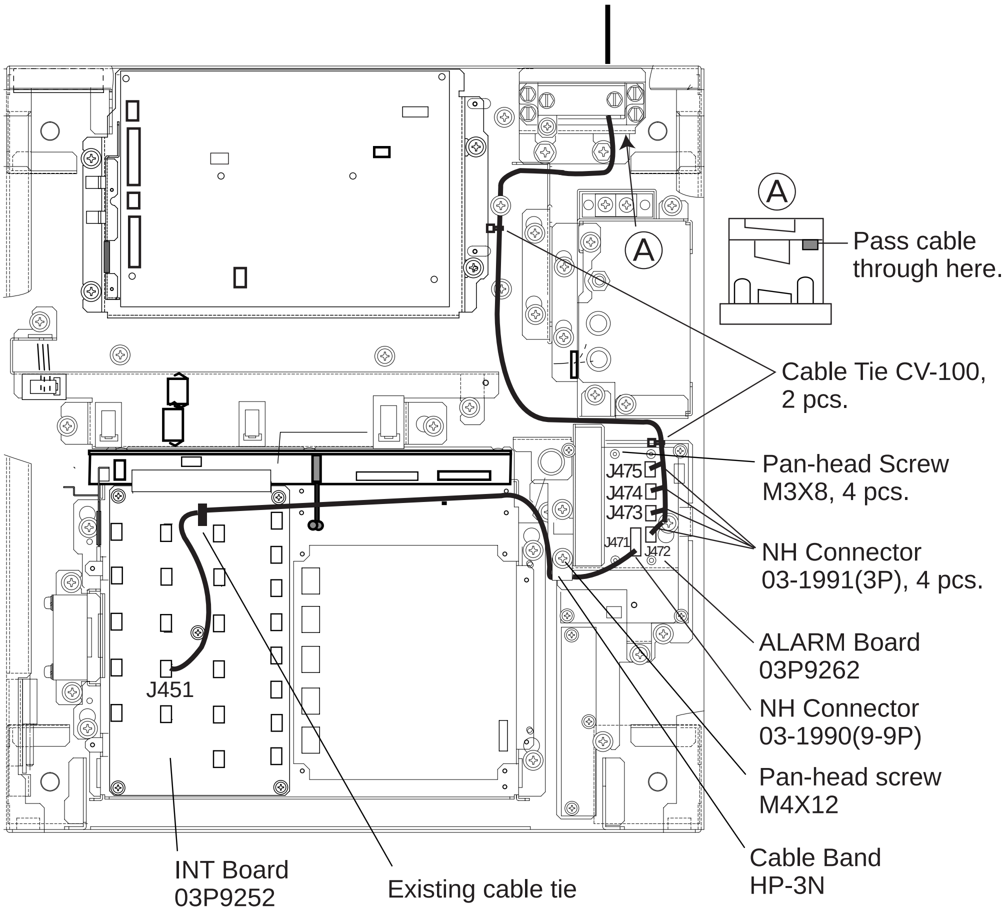
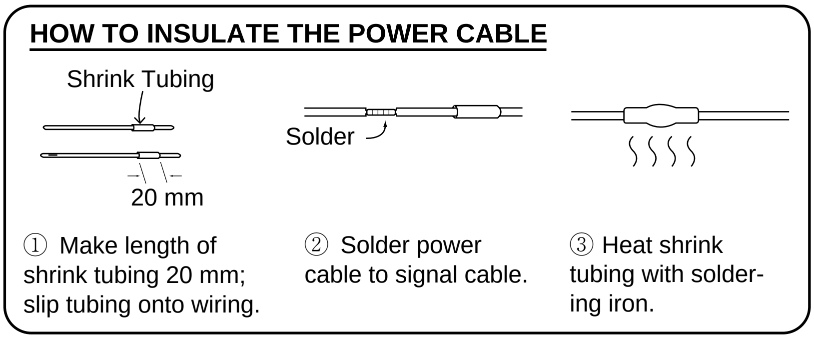


Figure 4-16 Display unit, inside view



4.6 AC-DC Conversion Kit

The AC-DC Conversion Kit enables conversion from AC power to DC power, and mainly consists of a circuit board and filter.

AC-DC Conversion Kit (for 24 rpm antenna) Type: OP03-161-24, Code No.: 008-499-760				**AC-DC Conversion Kit (for 42 rpm antenna) Type: OP03-161-42, Code No.: 008-499-770**			
Name	**Type**	**Code No.**	**Qty**	**Name**	**Type**	**Code No.**	**Qty**
POWER Board	03P9246A	008-487-440	1	POWER Board	03P9246C	008-493-700	1
Filter	RDP-124 (DC)	008-492-460	1	Filter	RDP-124 (DC)	008-492-460	1

1. Slide the monitor forward until the PTU Board and filter are in view and easily accessed.
2. Follow (2) and (3) on page 1-8 to remove the PTU Board cover.
3. Unplug all connectors from the PTU Board.
4. Loosen the screws fixing the PTU Board, and then remove the PTU Board.
5. Fasten new PTU Board with screws removed in step 4.
6. Plug in six connectors to their proper locations on the PTU Board. Do not connect J101.
7. Loosen four screws fixing the AC filter.
8. Fasten new filter.
9. Connect cable from filter to J101 on the PTU Board.
10. Fasten the PTU board cover.
11. Connect power cable from ship's mains.
12. Close the monitor.

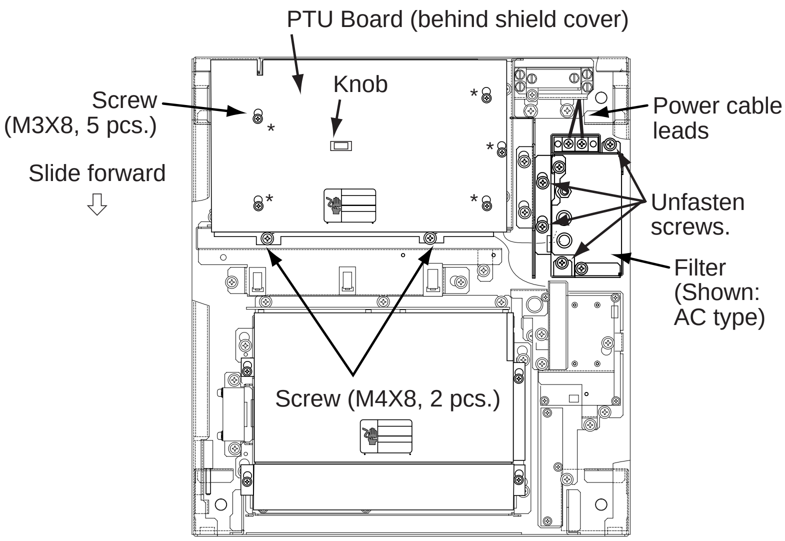


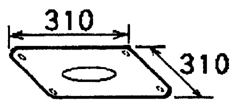
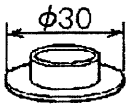
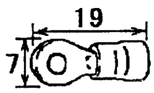
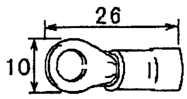
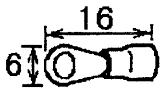
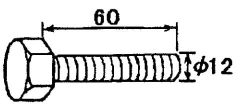
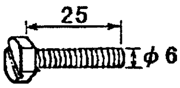
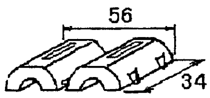
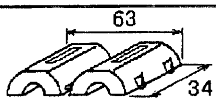
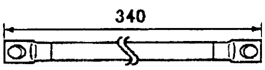
Figure 4-17 Display unit, inside view

FURUNO

CODE NO.	008-493-160	03FS-X-9404 -7
TYPE	CP03-19104	1/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	防蝕ゴム.1. CORROSION-PROOF RUBBER MAT		03-001-3001-0 CODE NO. 300-130-010	1	空中線部用 FOR ANTENNA UNIT
2	シールワッシャ SEAL WASHER		03-001-3002-0 CODE NO. 300-130-020	4	空中線部用 FOR ANTENNA UNIT
3	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	26	空中線部用 FOR ANTENNA UNIT
4	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	空中線部用 FOR ANTENNA UNIT
5	圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO. 000-116-634	1	空中線部用 FOR ANTENNA UNIT
6	六角ﾎﾞﾙﾄ（全ﾈｼﾞ） HEX. BOLT		M12X60 SUS304 CODE NO. 000-862-191	4	空中線部用 FOR ANTENNA UNIT
7	六角ﾎﾞﾙﾄ HEX.BOLT		M6X25 SUS304 CODE NO. 000-862-180	1	空中線部用 FOR ANTENNA UNIT
8	EMIｺｱ EMI CORE		RFC-10 CODE NO. 000-141-085	2	空中線部用 FOR ANTENNA UNIT
9	EMIｺｱ EMI CORE		RFC-13 CODE NO. 000-141-084	2	空中線部用 FOR ANTENNA UNIT
10	ｱｰｽ線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	1	空中線部用 FOR ANTENNA UNIT

DWG NO.
C3464-M05- G

FURUNO ELECTRIC CO ., LTD.

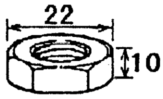
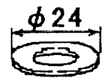
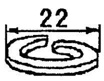
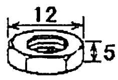
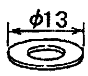
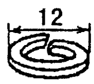
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-493-160	03FS-X-9404 -7
TYPE	CP03-19104	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ナット 1種 HEX. NUT		M12 SUS304 CODE NO. 000-863-112	4	空中線部用 FOR ANTENNA UNIT
12	ミガキ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	4	空中線部用 FOR ANTENNA UNIT
13	バネ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	4	空中線部用 FOR ANTENNA UNIT
14	六角ナット 1種 HEX. NUT		M6 SUS304 CODE NO. 000-863-109	1	空中線部用 FOR ANTENNA UNIT
15	ミガキ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	空中線部用 FOR ANTENNA UNIT
16	バネ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	空中線部用 FOR ANTENNA UNIT

DWG NO.
C3464-M06- G

FURUNO ELECTRIC CO ., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-503-450	03FS-X-9408 -1
TYPE	CP03-19105	1/2

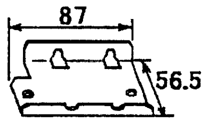
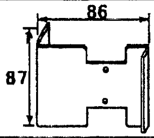
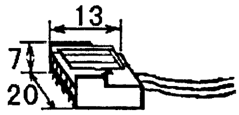
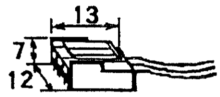
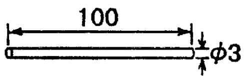
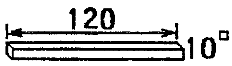
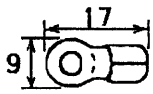
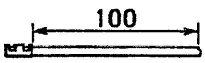
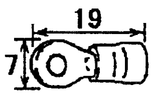
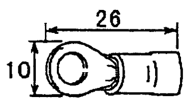
工事材料表

INSTALLATION MATERIALS

FR-2115/2115-B
FR-2125/2125V
FR-2125W/2125-B
FR-2135S/2135SW
FR-2135S-B/2165DS
FR-2155/2155-B
FR-2135SW-MSA

船舶用レーダー

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	下クランプ前板 LOWER CLAMP FRONT PLATE		03-144-1425-1 CODE NO. 100-263-601	1	
2	下クランプ後板 LOWER CLAMP REAR PLATE		03-144-1426-0 CODE NO. 100-263-610	1	
3	VHコネクタ組品 VH CONNECTOR ASSY.		03-1737(5P) CODE NO. 008-454-380	1	
4	VHコネクタ組品 VH CONNECTOR ASSY.		03-1738(3P) CODE NO. 008-454-390	1	
5	ｽﾐﾁｭｰﾌﾞF(Z) HEAT-SHRINK TUBE		3X0.25 ｸﾛ ＊0.10M＊ CODE NO. 000-105-874	2	
6	ｼｰﾙﾄﾞﾌｫｰﾑ SHIELD FOAM		71TS-10-10＊0.12M＊ CODE NO. 000-808-456	4	
7	圧着端子 CRIMP-ON LUG		8NK4 CODE NO. 000-538-180	2	
8	NHコネクタ ＊ｾﾝｻﾞｲ＊ NH CONNECTOR ASSY.		AWG24 ＊0.1M＊ CODE NO. 000-132-342	20	
9	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	5	
10	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	

DWG NO.
C3464-M07- B

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

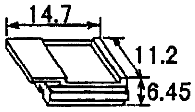
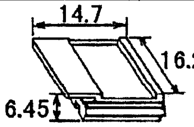
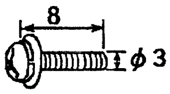
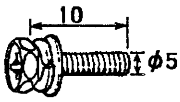
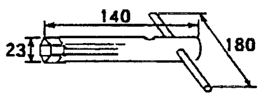
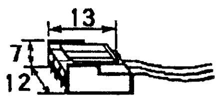
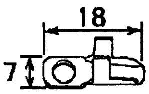
FURUNO

CODE NO.	008-503-450	03FS-X-9408 -1
TYPE	CP03-19105	2/2

工事材料表
INSTALLATION MATERIALS

FR-2115/2115-B
FR-2125/2125V
FR-2125W/2125-B
FR-2135S/2135SW
FR-2135S-B/2165DS
FR-2155/2155-B
FR-2135SW-MSA

船舶用ﾚｰﾀﾞｰ
MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	ｺﾈｸﾀ CONNECTOR		H3P-SHF-AA CODE NO. 000-505-596	2	
12	ｺﾈｸﾀ CONNECTOR		H5P-SHF-AA CODE NO. 000-505-598	2	
13	+-ﾅﾍﾞ ｾﾑｽﾈｼﾞ B WASHER HEAD SCREW		M3X8 C2700 MBNI2 CODE NO. 000-881-404	2	
14	+ｱﾌﾟ ｾｯﾄUIｾﾑｽB +HEX.BOLT (WASHER HEAD)		M5X10 SUS304 CODE NO. 000-802-288	2	
15	ﾊﾟｲﾌﾟﾎﾞｯｸｽPS PIPE BOX SPANNER		PS0017 CODE NO. 000-830-140	1	
16	ｺﾈｸﾀ(ｸﾐﾋﾝ) CONNECTOR ASSY.		VH3P-L300-AA CODE NO. 000-141-014	2	
17	特殊ﾗｸﾞ LUG		ｱﾅｹｲ4 ｽｽﾞ CODE NO. 000-536-100	2	

DWG NO.
C3464-M08- B

FURUNO ELECTRIC CO ., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

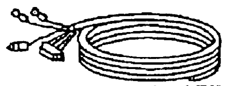
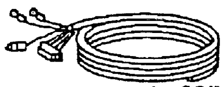
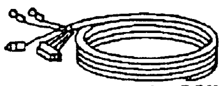
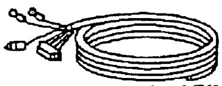
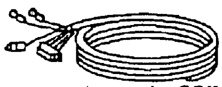
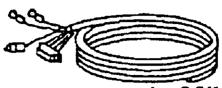
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TYPE		1/1

工事材料表

INSTALLATION MATERIALS

FR-2115/2115-B 船舶用レーダ
FR-2125/2125-B

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-75-15		1	選択 (K3/S) TO BE SELECTED
			CODE NO.	008-485-400		
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-75-20		1	選択 (K3/S) TO BE SELECTED
			CODE NO.	008-485-410		
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-75-30		1	選択 (K3/S) TO BE SELECTED
			CODE NO.	008-485-420		
4	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-74-15		1	選択 (K1/HK) TO BE SELECTED
			CODE NO.	008-485-430		
5	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-74-20		1	選択 (K1/HK) TO BE SELECTED
			CODE NO.	008-485-440		
6	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-74-30		1	選択 (K1/HK) TO BE SELECTED
			CODE NO.	008-485-450		

DWG NO.
C3464-M03- B

FURUNO ELECTRIC CO ., LTD

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

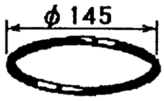
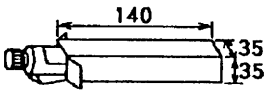
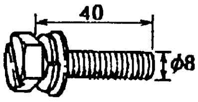
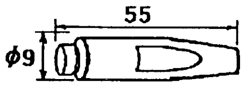
FURUNO

CODE NO.	008-487-130	03FS-X-9403 -2
TYPE	CP03-19101	1/1

工事材料表
INSTALLATION MATERIALS

FR-2115/2125/2125W 船舶用ﾚｰﾀﾞ

MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Oﾘﾝｸﾞ O-RING		JISB2401-P135 CODE NO. 000-808-309	1	
2	ｽﾘｰﾎﾞﾝﾄﾞ ADHESIVE		1211 50G CODE NO. 000-854-118	1	
3	六角ｾﾑｽB ｽﾘﾜﾘ HEX. BOLT (SLOTTED, WASHER HEAD)		M8X40 SUS304 CODE NO. 000-882-071	8	
4	ﾋﾟﾝ PIN		03-141-0301-2 CODE NO. 100-266-882	2	

DWG NO.
C3464-M04- C

FURUNO ELECTRIC CO., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

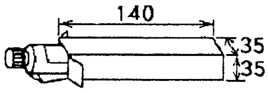
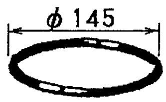
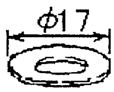
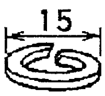
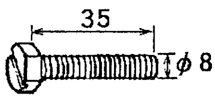
A-6A

FURUNO

CODE NO.	008-485-250	03FS-X-9409 -0
TYPE	CP03-24201	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ｽﾘｰﾎﾞﾝﾄﾞ SEALANT		1211 50G		1	
			CODE NO.	000-854-118		
2	Oﾘﾝｸﾞ O-RING		JISB2401-P135		1	
			CODE NO.	000-808-309		
3	ﾐｶﾞｷ平座金 FLAT WASHER		M8 SUS304		8	
			CODE NO.	000-864-130		
4	ﾊﾞﾈ座金 SPRING WASHER		M8 SUS304		8	
			CODE NO.	000-864-262		
5	六角ﾎﾞﾙﾄ ｽﾘ割り HEX.BOLT (SLOTTED HEAD)		M8X35 SUS304		8	
			CODE NO.	000-862-153		

DWG NO.
C3453-M04- A

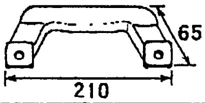
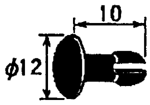
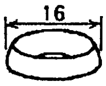
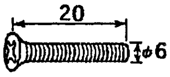
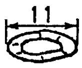
FURUNO ELECTRIC CO., LTD.

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-478-830	03FS-X-9501 -5
TYPE	FP03-06201	1/1

付属品表
ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	取手 HANDLE		14-002-1125-2 CODE NO. 840-211-252	2	
2	ｽﾅｯﾌﾟﾎﾞﾀﾝ PLASTIC RIVET		KB-13ﾖｳ ﾎﾞﾀﾝｸﾛ CODE NO. 000-570-276	4	
3	ﾛｰｾﾞｯﾄ座金 ROSETTE WASHER		M6 C2700W ﾎﾟﾘｼｰﾙ ｸﾛ CODE NO. 000-864-910	4	
4	+丸皿小ﾈｼﾞ OVAL COUNTERSUNK HEAD SCREW		M6X20 C2700W ﾎﾟﾘｼｰﾙ ｸﾛ CODE NO. 000-861-475	4	
5	波座金 WAVE WASHER		WW-6 SUS CODE NO. 000-864-350	4	

DWG NO. C3464-F01- F

FURUNO ELECTRIC CO ., LTD.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

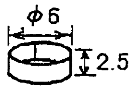
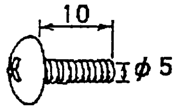
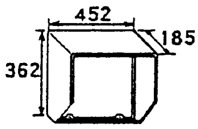
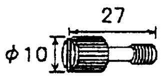
CODE NO.	008-490-970	03FS-X-9502 -4
TYPE	FP03-06503	1/1

付属品表
ACCESSORIES

FR-2115/2115-B
FR-2125/2125W
FR-2125-B
FR-2155/2155-B
FR-2135S/2135SW
FR-2135S-B/2165DS
GD-680/GP-680

船舶用レーダ
カラービデオプロッタ
カラーGPSプロッタ

MARINE RADAR
COLOR VIDEO PLOTTER
COLOR GPS PLOTTER

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	マキスペーサー SPACER		5X2.5		2	
			CODE NO.	000-808-429		
2	+トラスネジ SCREW		M5X10 C2700W		2	
			CODE NO.	000-808-430		
3	フード HOOD		03-144-1335-1		1	
			CODE NO.	100-263-331		
4	フードビス HOOD RETAINER		03-144-1336-1		2	
			CODE NO.	100-266-311		

DWG NO.
C3464-F02- E

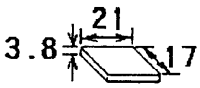
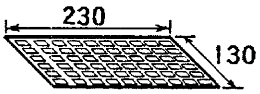
FURUNO ELECTRIC CO., LTD

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-485-480	03FS-X-9504 -5
TYPE	FP03-06502	1/1

付属品表 ACCESSORIES	FR-2115/2115-B FR-2125/2125-B FR-2155/2155-B FR-2135S/2135S-B FR-2135SW/2125V FR-2165DS	船舶用ﾚｰﾀﾞ MARINE RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	ﾕｰｻﾞｰｷｰｷｬｯﾌﾟ USER KEYCAP		03-144-1613-1		4	
			CODE NO.	100-263-831		
2	ﾕｰｻﾞｰｷｰｼｰﾄ(E) USER KEYSHEET(E)		03-144-1655-1		1	
			CODE NO.	100-263-881		

DWG NO.
C3464-F04- E

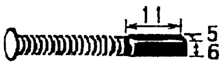
FURUNO ELECTRIC CO ., LTD

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-485-360	03FS-X-9301 -2
TYPE	SP03-12501	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2115/2115-B 船舶用レーダ FR-2125/2125-B FR-2125V MARINE RADAR	空中線用 FOR ANTENNA UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ｶｰﾎﾞﾝﾌﾞﾗｼ CARBON BRUSH		MG120-5X6X11 D8G	1		1	1袋2個入り 2pcs in bag 000-631-716

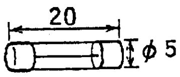
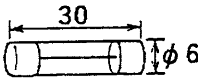
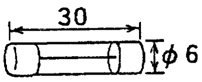
MFR'S NAME	FURUNO ELECTRIC CO., LTD	DWG NO.	C3464-P01- B	1/1

（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-503-470	03FS-X-9302 -3
TYPE	SP03-12505	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2115/2115-B 船舶用レーダ FR-2125/2125-B FR-2125V MARINE RADAR	指示部用 FOR DISPLAY UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGMB 2A 250V	4		8	000-122-000
2	ヒューズ FUSE		FGBO 20A AC125V	2		4	000-549-015
3	ヒューズ FUSE		FGBO 0.5A AC250V	3		6	000-549-018

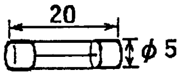
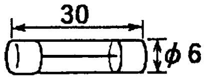
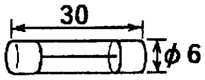
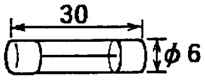
MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3464-P02- C	1/1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-503-460	03FS-X-9303 -5
TYPE	SP03-12506	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR		U S E	SETS PER VESSEL
	FR-2115/2115-B ~~FR-2115-B~~ FR-2125/2125V FR-2125W/2125-B FR-2155/2155-B FR-2135S/2135SW FR-2135S-B/2165DS	船舶用レーダ MARINE RADAR	指示部 FOR DISPLAY UNIT	

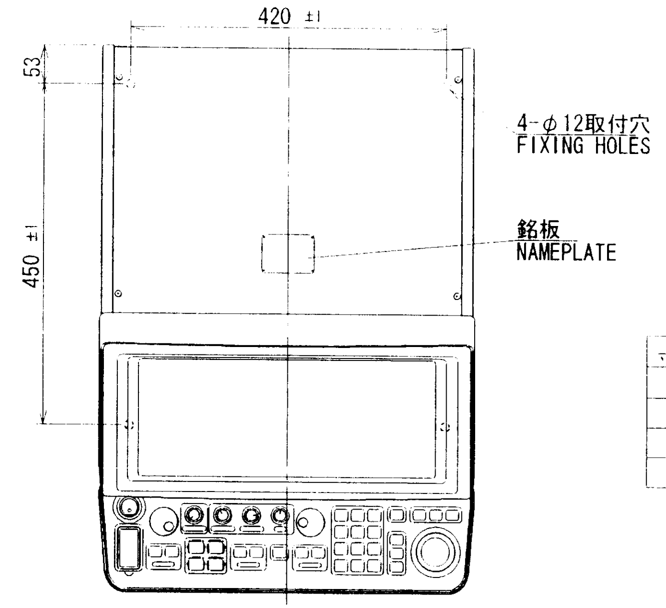
ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGMB 2A 250V	4		8	000-122-000
2	ヒューズ FUSE		FGBO 0.5A AC250V	3		6	000-549-018
3	ヒューズ FUSE		FGBO 5A AC250V	2		4	000-549-022
4	ヒューズ FUSE		FGBO 10A AC125V	2		4	000-549-065

MFR'S NAME	FURUNO ELECTRIC CO.,LTD.	DWG NO.		1/1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

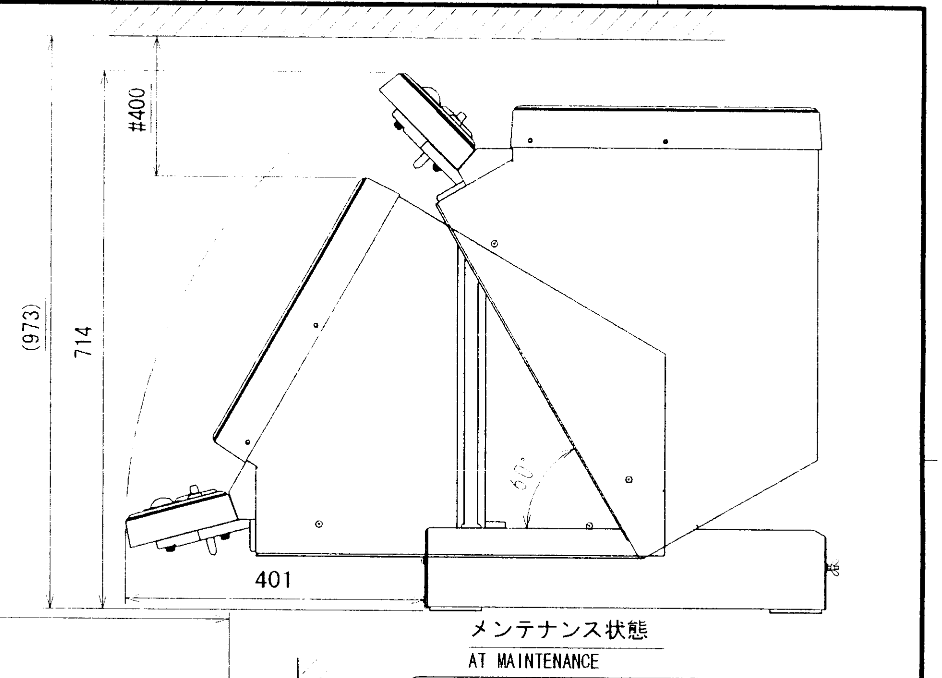
DWG NO.
C3464-P03- D

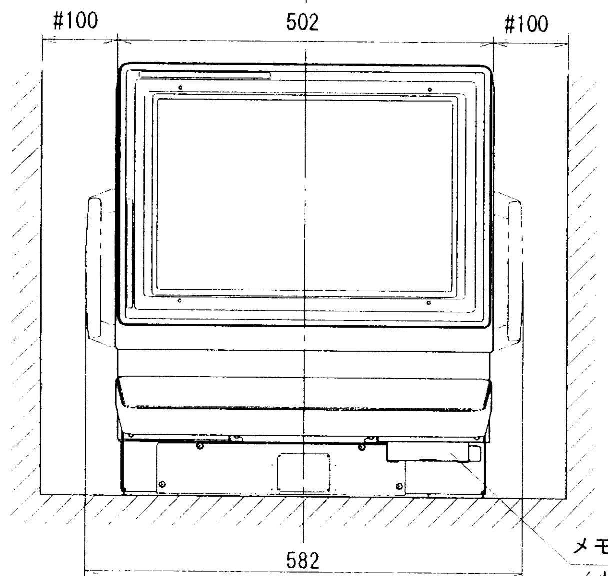
FURUNO

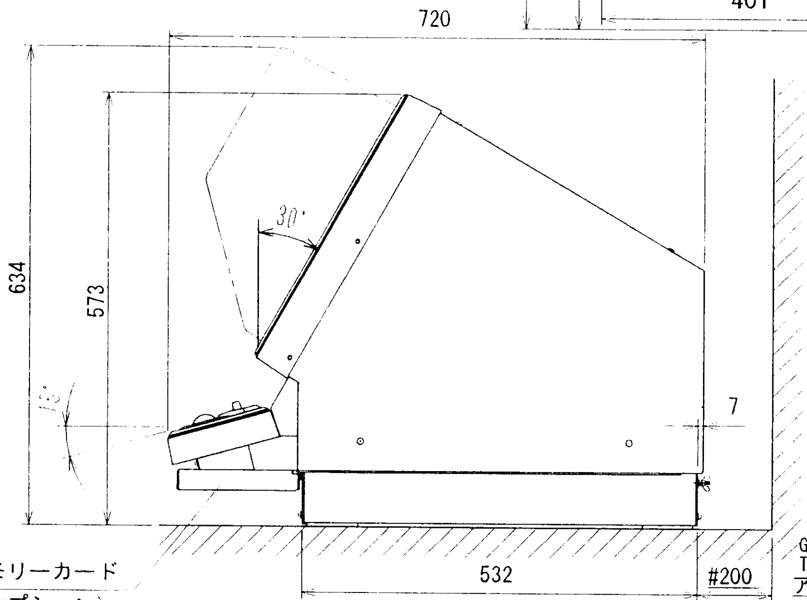


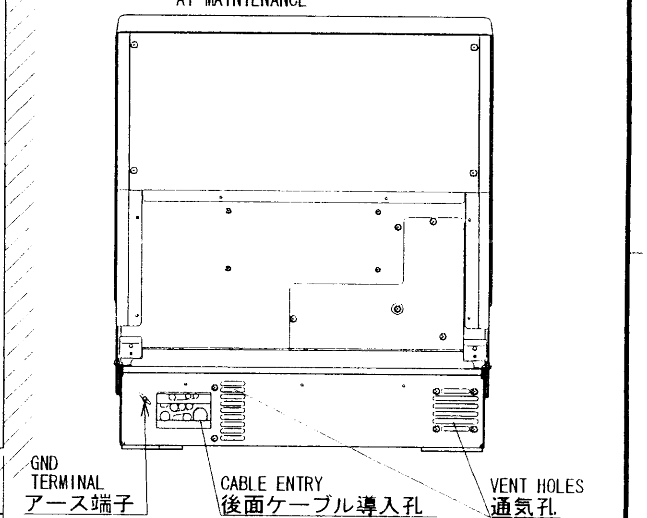
寸法区分(mm) DIMENSION	公差(mm) TOL.
L≦50	±1．5
50<L≦100	±2．5
100<L≦500	±3
500<L≦1000	±4

表1 TABLE 1







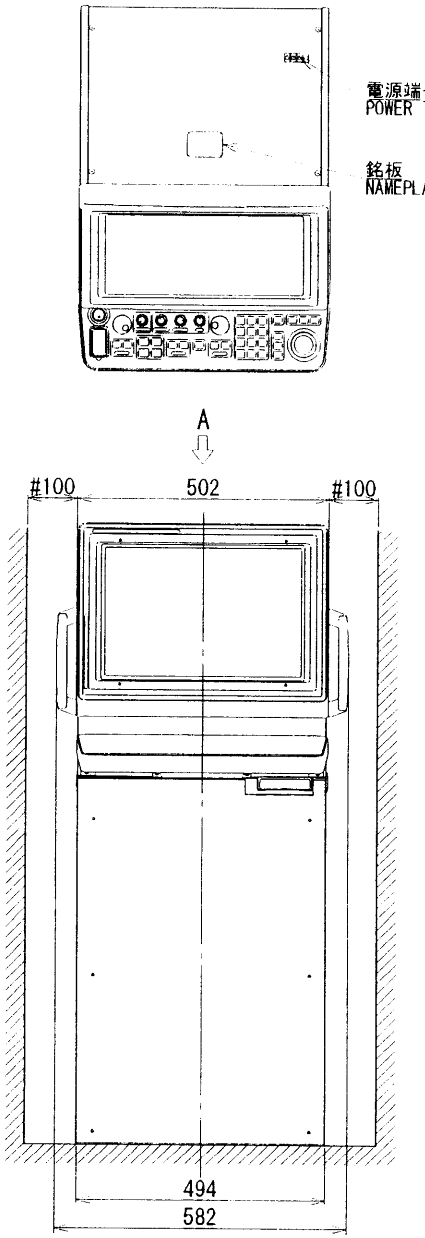


注　記　1） #印寸法は最小サービス空間寸法とする。
　　　　2） 指定外の寸法公差は、表1による。

NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

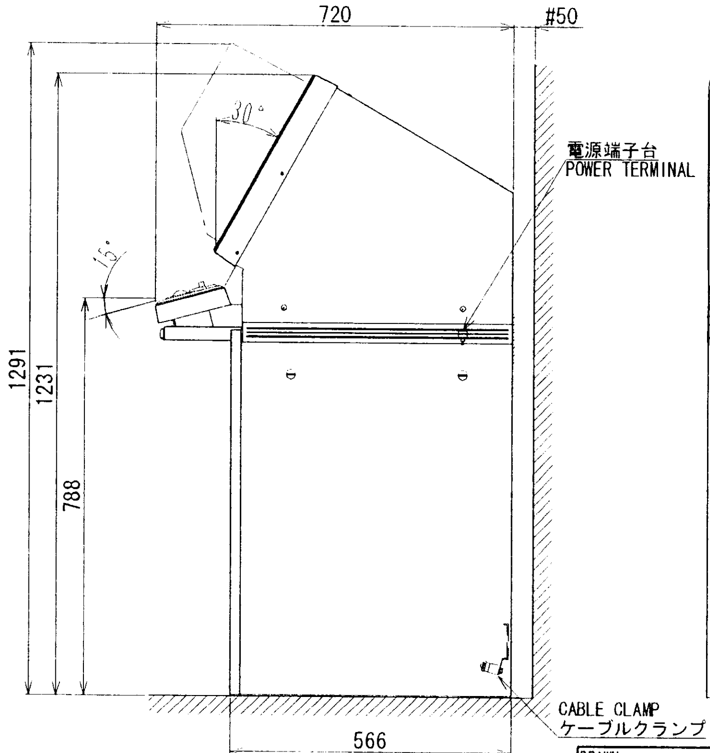
DRAWN July 19 '00 T.YAMASAKI			TITLE	RDP-124
CHECKED July 19 '00 Y.Kim	OTHERS		名称	指示部
APPROVED July 19 '00 Y.Kim	FR-2125 FR-2115			外寸図
SCALE 1/10	MASS 61 kg ±10%		NAME	DISPLAY UNIT
DWG No. C3464-G01- C	03-144-1010-G3			OUTLINE DRAWING

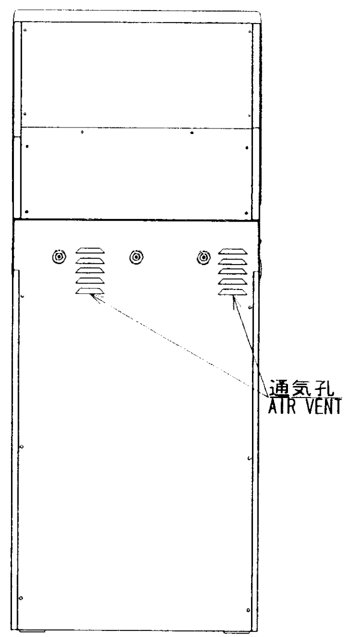
FURUNO ELECTRIC CO., LTD.

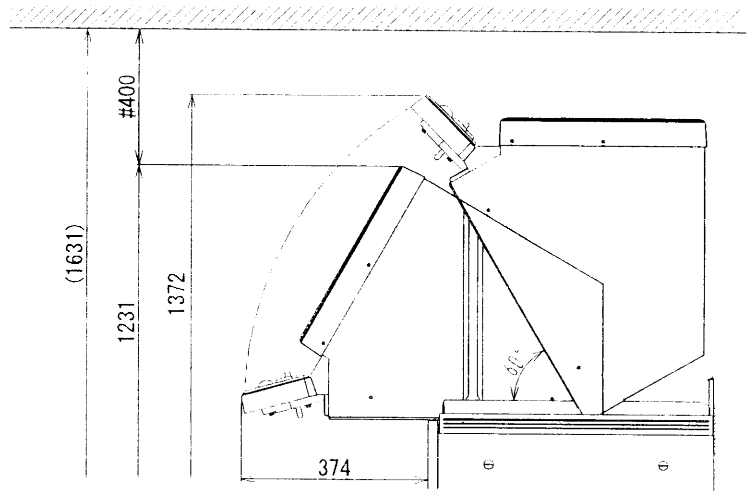


寸法区分 (mm) DIMENSION	公差 (mm) TOL.
L ≦ 50	±1.5
50 < L ≦ 100	±2.5
100 < L ≦ 500	±3
500 < L ≦ 1000	±4
1000 < L ≦ 2000	±5

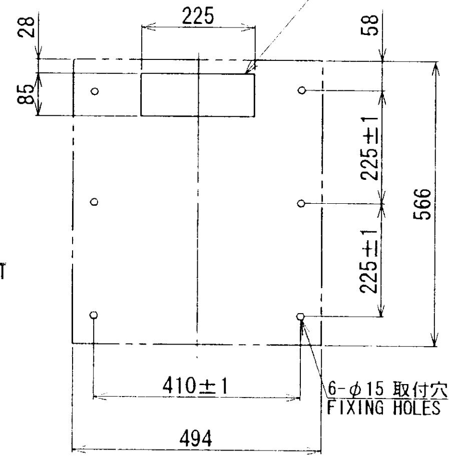
表 1
TABLE 1







メンテナンス状態
AT MAINTENANCE



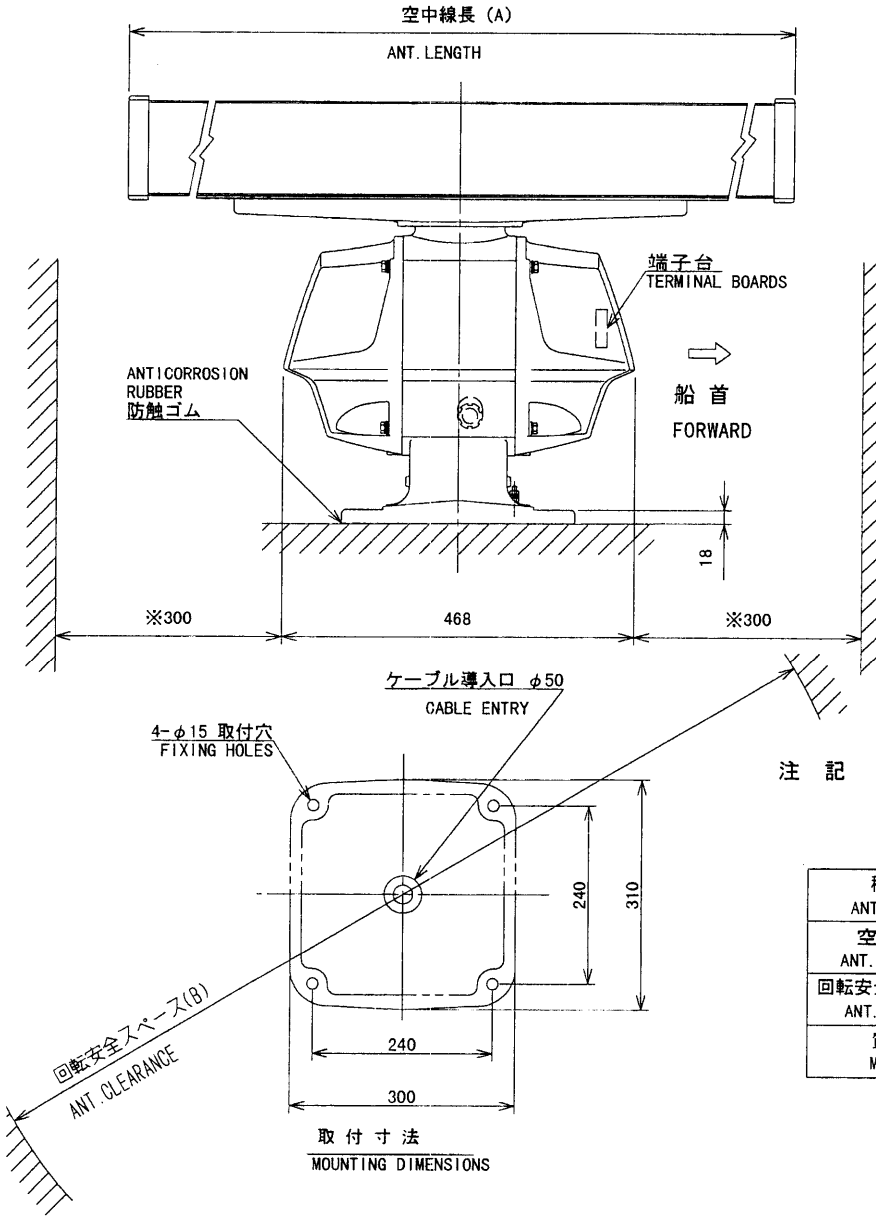
取付寸法図(矢視A)
MOUNTING DIMENSIONS (VIEW A)

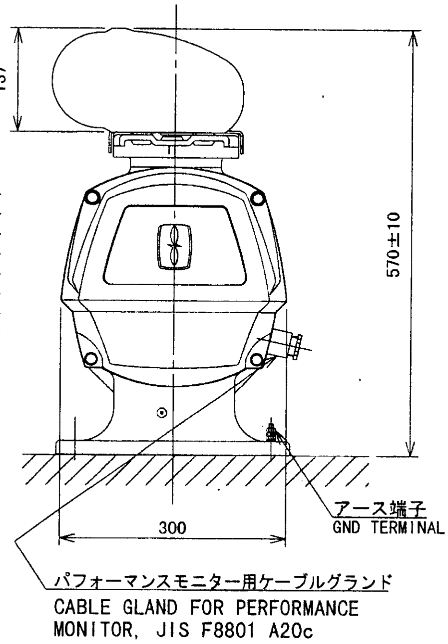
注　記　1)　#印寸法は最小サービス空間寸法とする。
　　　　2)　指定外の寸法公差は、表1による。

NOTE　1. #: RECOMMENDED SERVICE CLEARANCE.
　　　2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN		TITLE	RDP-124
CHECKED	OTHERS	名称	指示部（コンソール型）
APPROVED	FR-2125 FR-2115		外寸図
SCALE 1/15	MASS 100 kg ±10%	NAME	DISPLAY UNIT (CONSOLE TYPE)
DWG. No. C3464-G03- D	03-144-1800-G6		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.





注 記 NOTE 1. ※：推奨サービス空間
RECOMMENDED SERVICE CLEARANCE

NOTE 2.

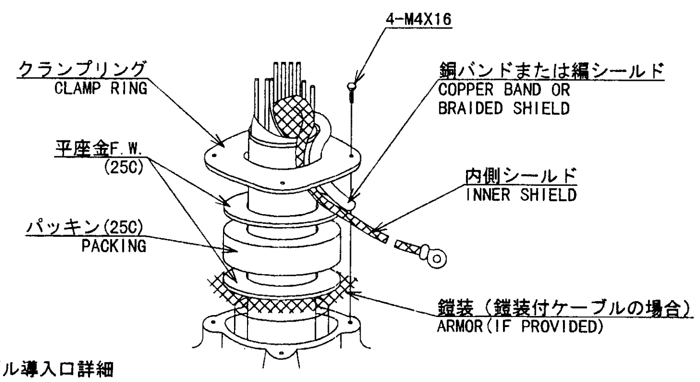
種類 ** ANT. TYPE	200cm型TYPE (XN-20AF)	240cm型TYPE (XN-24AF)
空中線長 (A) ANT. LENGTH	2,040±10 mm	2,550±10 mm
回転安全スペース (B) ANT. CLEARANCE	2,200 mm	2,700 mm
質 量 MASS	39 kg	42 kg

**選択可能な空中線部種類は、レーダー型式により異なる。各仕様を参照のこと。
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.

NOTE 3. 指定外の寸法公差は表1による。
REFER DIMENSION TOLERANCE TO TABLE 1.

範 囲 DIMENSION	公差 TOL
0＜L≦50	±1.5mm
50＜L≦100	±2.5mm
100＜L≦500	±3mm
500＜L≦1000	±4mm
1000＜L≦2000	±5mm
2000＜L≦4000	±7mm
4000＜L≦8000	±10mm
8000＜L	±15mm

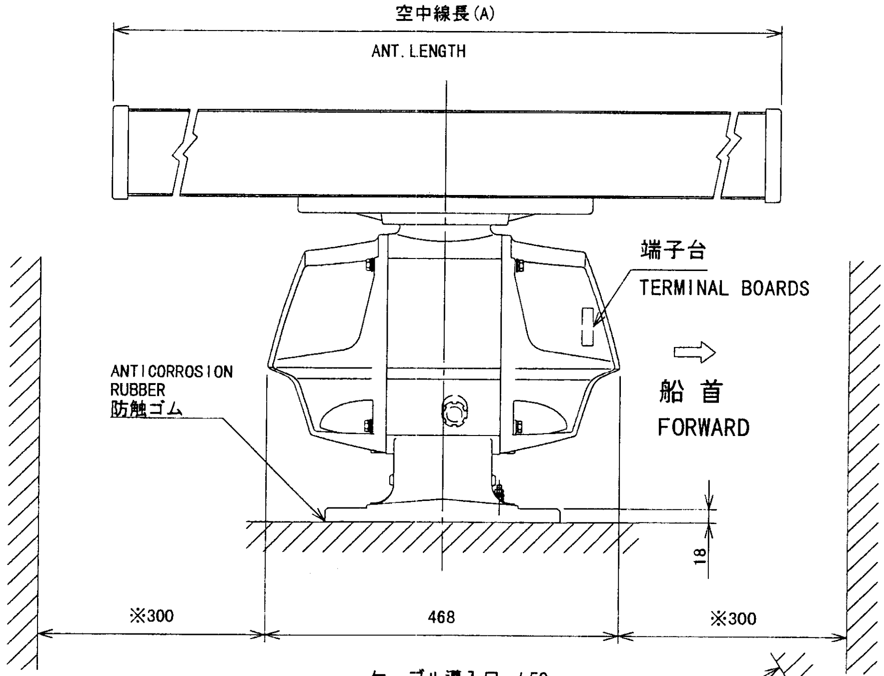
表 1
TABLE 1

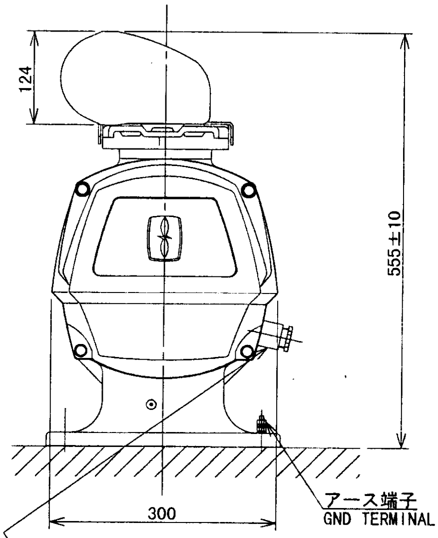


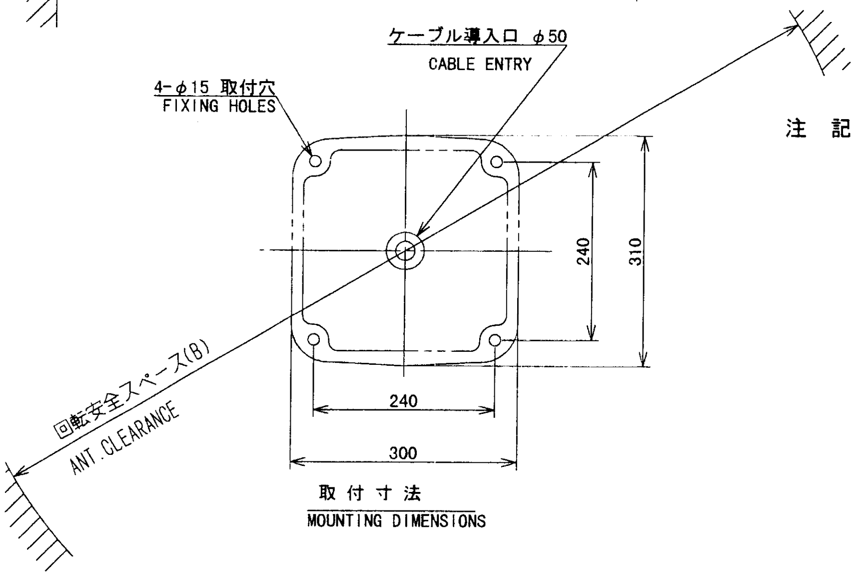
ケーブル導入口詳細
DETAIL OF CABLE ENTRY

DRAWN Aug.20'99 T.YAMASAKI		TITLE	RSB-0074/0075-20/24AF
CHECKED Aug.20'99 K.Kusunoki	OTHERS FR-1500 SER.	名称	空中線部
APPROVED Aug.20'99 K.Kusunoki	FR-1700 SER. FR-2115/2125		外寸図
SCALE 1/10	MASS kg	NAME	ANTENNA UNIT
DWG. No. C3464-G02- D	03-143-3000-G2		OUTLINE DRAWING

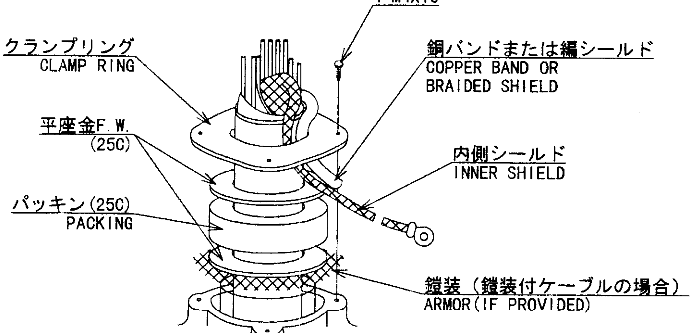
FURUNO







取付寸法
MOUNTING DIMENSIONS



ケーブル導入口詳細
DETAIL OF CABLE ENTRY

注記

NOTE 1. ※:推奨サービス空間
RECOMMENDED SERVICE CLEARANCE

NOTE 2.

種類 ** ANT. TYPE	120cm型TYPE (XN-12AF)
空中線長(A) ANT. LENGTH	1,260±10 mm
回転安全スペース(B) ANT. CLEARANCE	1,400 mm
質量 MASS	33 kg

**選択可能な空中線部種類は、レーダー型式により異なる。各仕様を参照のこと。
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.

NOTE 3. 指定外の寸法公差は表1による。
REFER DIMENSION TOLERANCE TO TABLE 1.

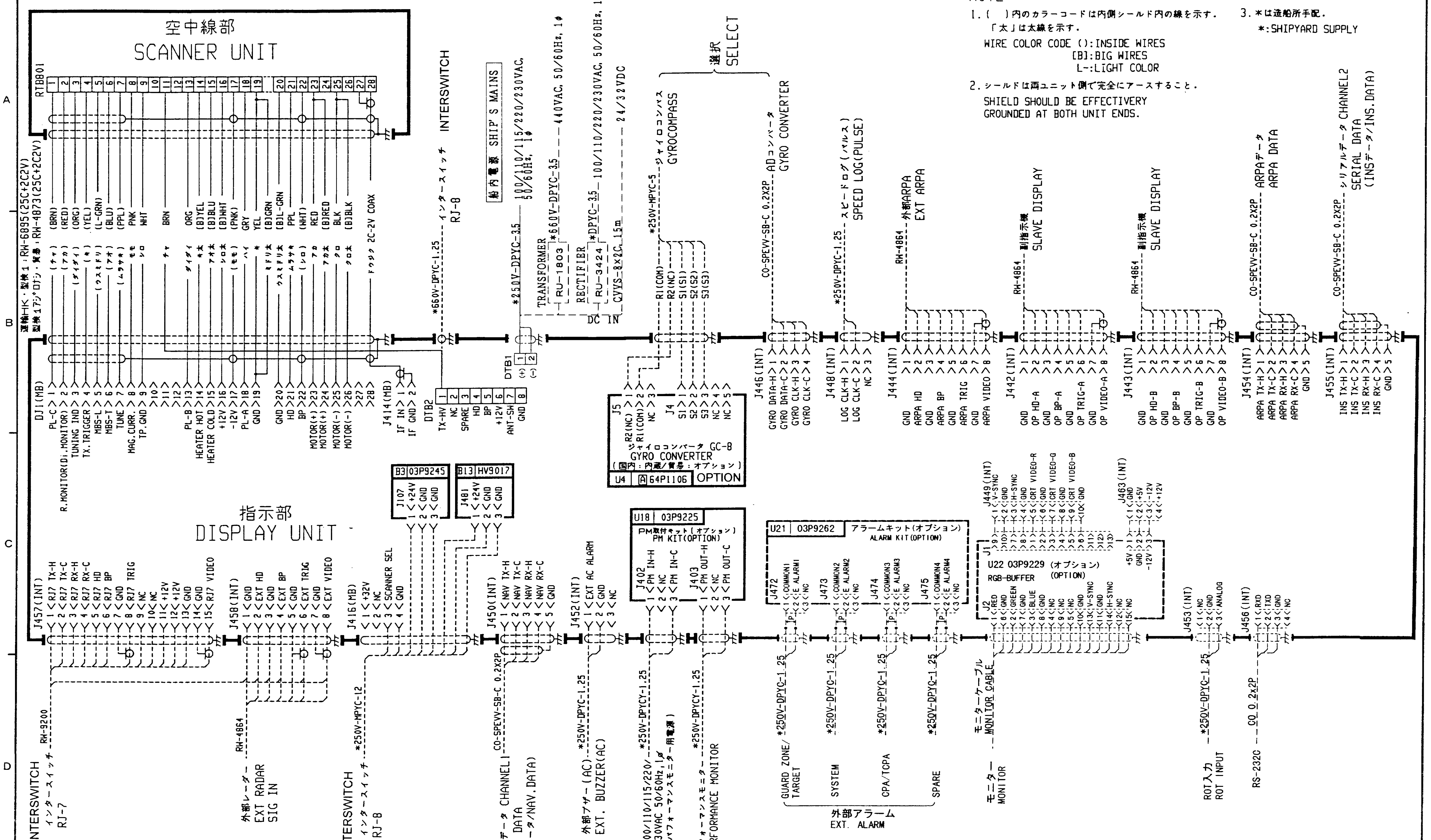
範囲 DIMENSION	公差 TOL
0<L≦50	±1.5mm
50<L≦100	±2.5mm
100<L≦500	±3mm
500<L≦1000	±4mm
1000<L≦2000	±5mm
2000<L≦4000	±7mm
4000<L≦8000	±10mm
8000<L	±15mm

表1
TABLE 1

DRAWN Aug 31 '99 T.YAMASAKI		TITLE	RSB-0074/0075-12AF
CHECKED Aug 31 '99 K.Kusunoki	OTHERS FR-1500 SER.	名称	空中線部
APPROVED Aug 31 '99 K.Kusunoki	FR-1700 SER. FR-2115/2125		外寸図
SCALE 1/10	MASS kg	NAME	ANTENNA UNIT
DWG. No. C3464-G04- E	03-144-3000-G2		OUTLINE DRAWING

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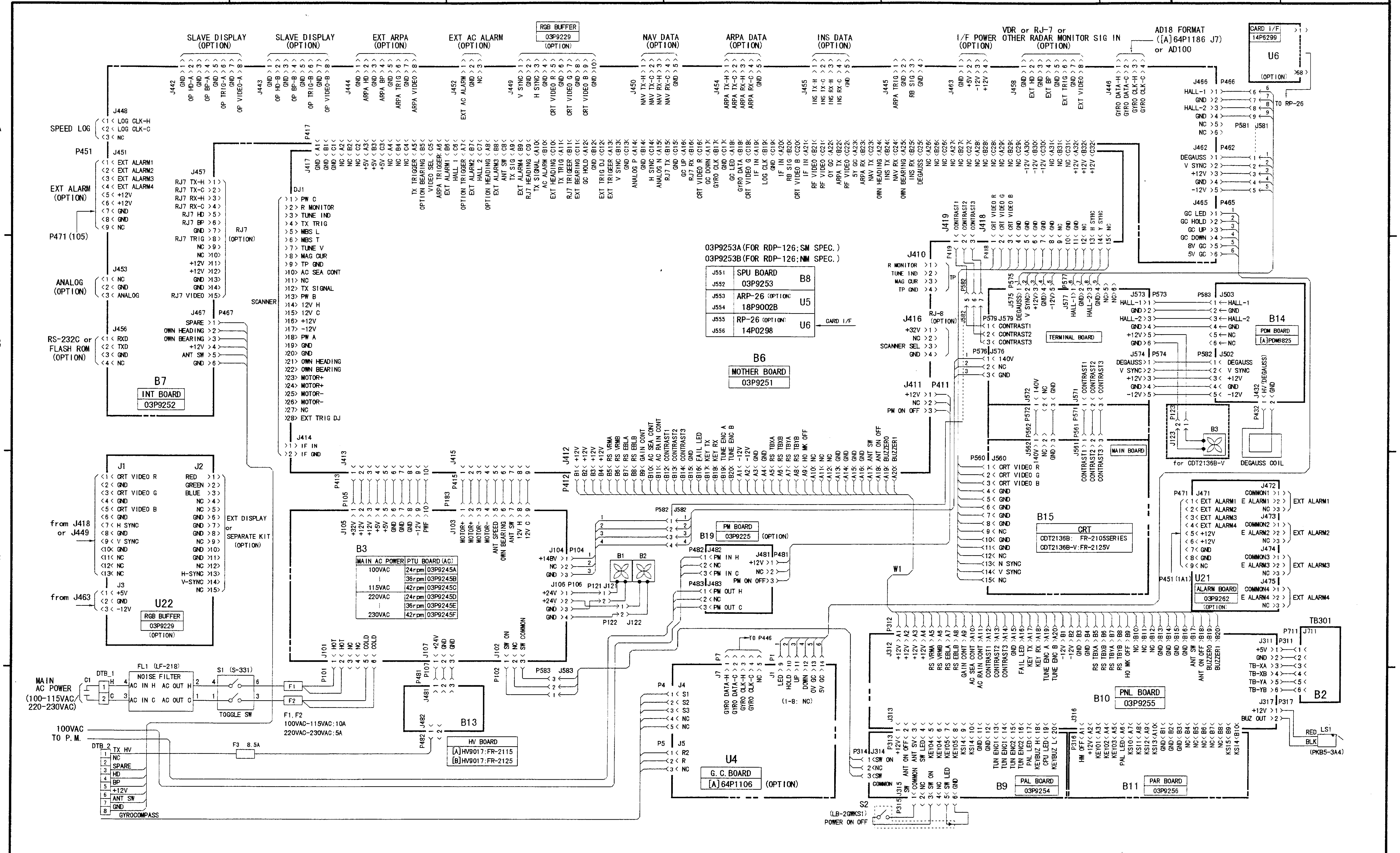
NOTE

1. ( )内のカラーコードは内側シールド内の線を示す。
「太」は太線を示す。
WIRE COLOR CODE ():INSIDE WIRES
[B]:BIG WIRES
L-:LIGHT COLOR
2. シールドは両ユニット側で完全にアースすること。
SHIELD SHOULD BE EFFECTIVERY GROUNDED AT BOTH UNIT ENDS.
3. *は造船所手配。
*:SHIPYARD SUPPLY

DRAWN Apr.22'99 T.YAMASAKI		TYPE FR-2115/2125/2125V
CHECKED Apr.22'99 K.Kusumoki		名称 船舶用レーダー 相互結線図
APPROVED Apr.22'99 K.Kusumoki		
SCALE /	MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME MARINE RADAR
DWG NO. C3464-C01- G	03-144-6001- 6	INTERCONNECTION DIAGRAM

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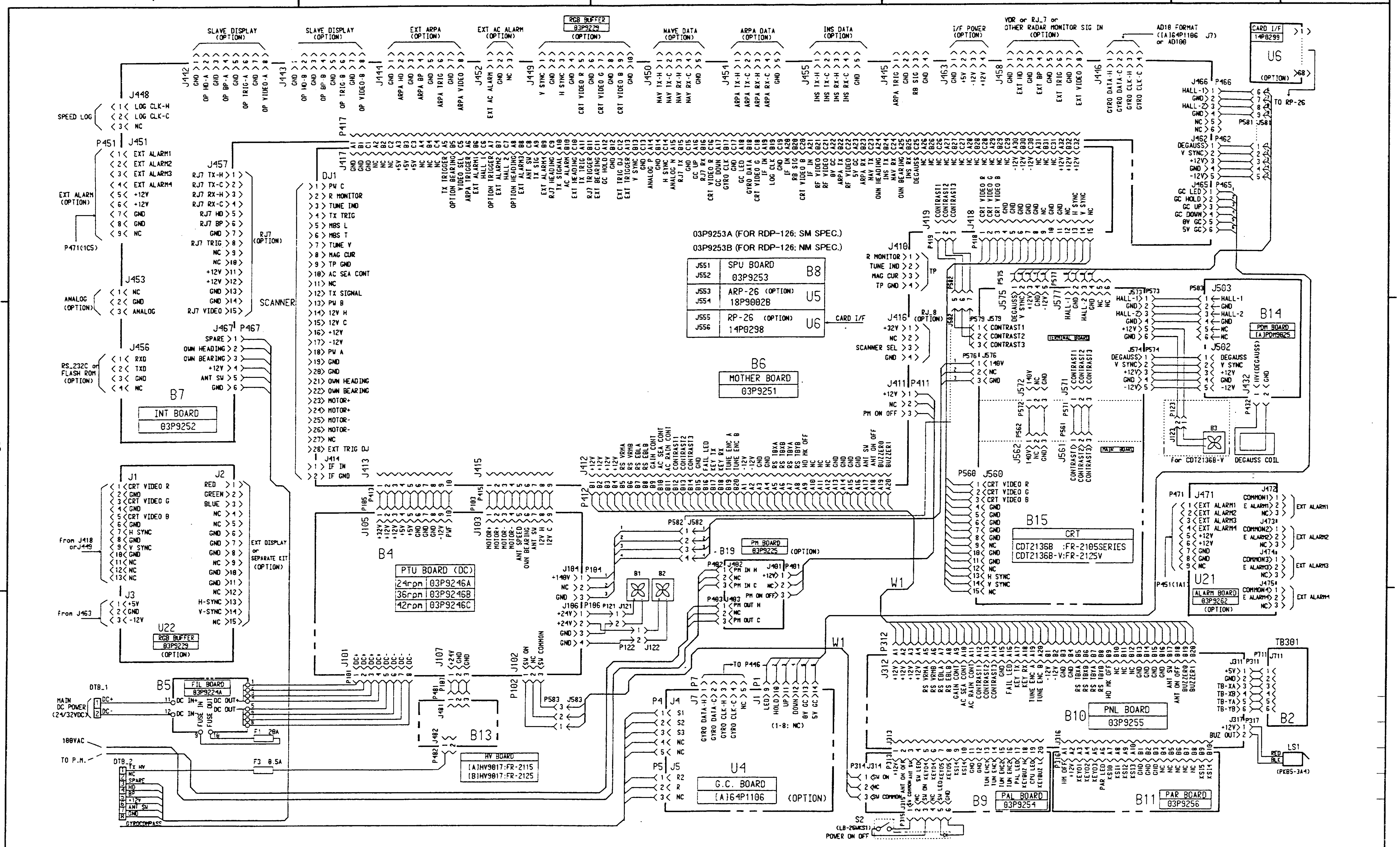


DRAWN Jan 18 '00 T.YAMASAKI		TITLE	RDP-124/126
CHECKED Jan 18 '00 K.Kusunoki		名称	指示部総合（AC仕様）
APPROVED Jan 18 '00 K.Kusunoki			回路図
SCALE	MASS kg	NAME	DISPLAY UNIT GENERAL(AC SOURCE)
DWG No. C3464-K01- H	03-144-6008-10		SCHEMATIC DIAGRAM

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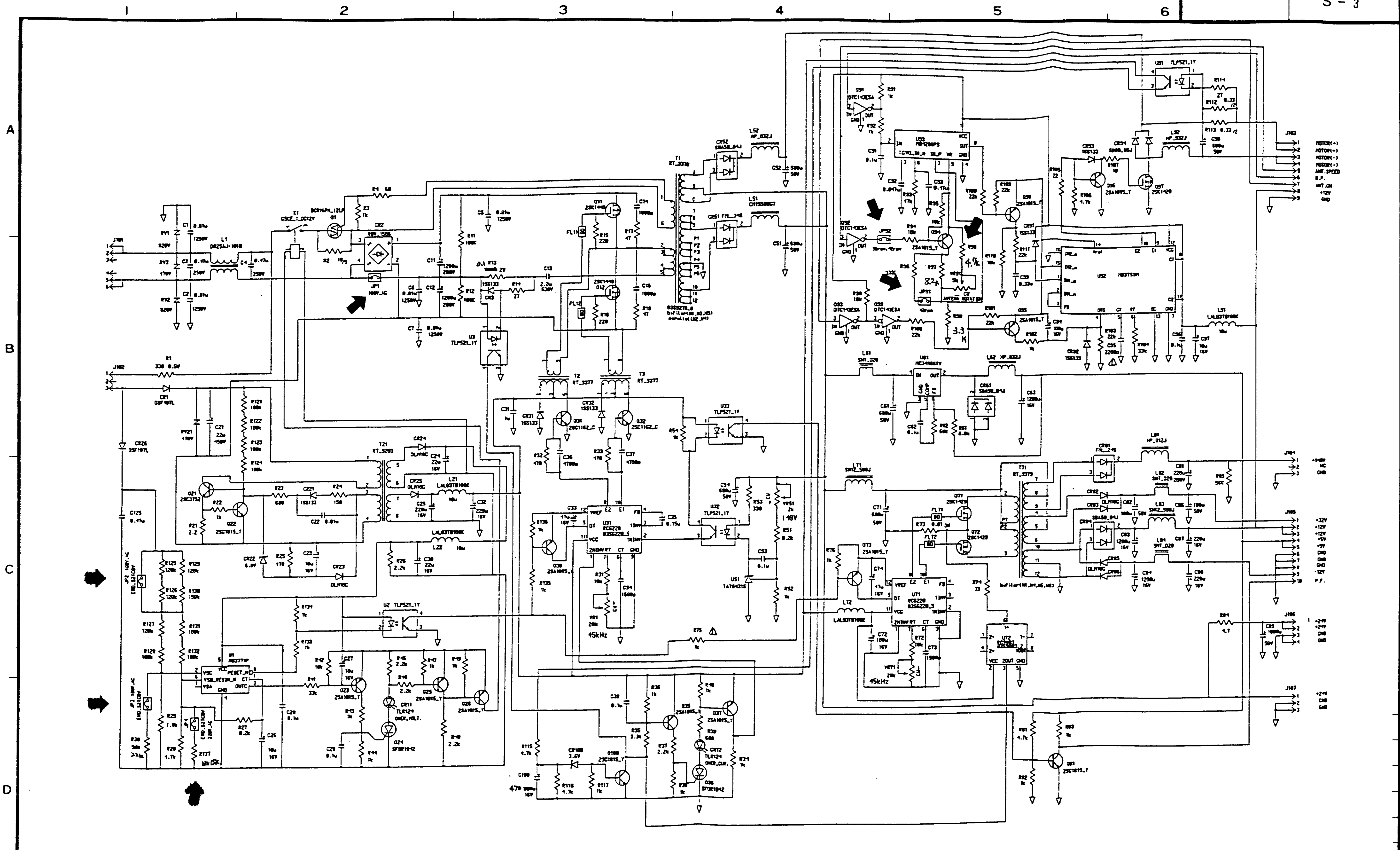
FURUNO

S-2a



DRAWN Apr 22'99 T.YAMASAKI		TYPE RDP-124/126
CHECKED Apr 22'99 K.Kusunoki	OTHERS	名称 指示部総合（DC仕様）
APPROVED Apr 22'99 K.Kusunoki	FR-2125 FR-2115	回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL) BLOCK NO.	NAME DISPLAY UNIT GENERAL(DC SOURCE
DWG NO. C3464-K19- D	03-144-6009- 6	SCHEMATIC DIAGRAM

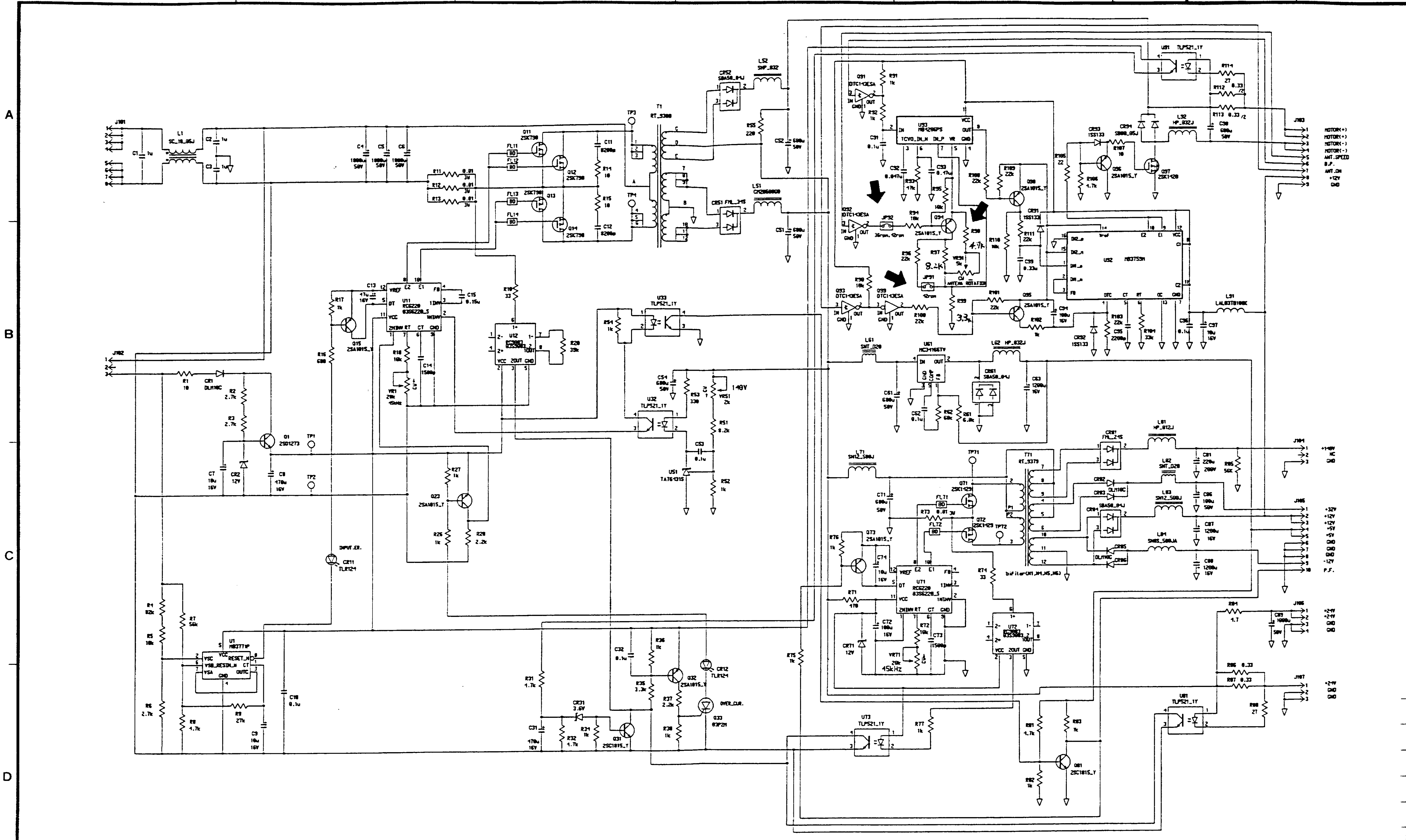
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PWB	POWER	ANTENNA	JP1	JP2	JP3	JP4	JP91	JP92	R98
03P9245 A	100 VAC	24rpm	Short	Short	Short	Cut	Cut	Cut	4.7 k
03P9245 C	100 VAC	42rpm	Short	Short	Short	Cut	Cut	Short	1.2 k
03P9245 D	220 VAC	24rpm	Cut	Cut	Cut	Short	Cut	Cut	4.7 k
03P9245 F	220 VAC	42rpm	Cut	Cut	Cut	Short	Cut	Short	1.2 k

DRAWN Sep.4.'98 E.Kaihi...		TYPE	03P9245
CHECKED Sep.4.'98 K.Okamoto		名称	AC電源基板
APPROVED Sep.4.'98 M.Yamamoto	FR-2125 FR-2115		回路図
SCALE / MASS kg	APPLICABLE TO; (MODEL) BLOCK NO.	NAME	PTU BOARD(AC)
DWG NO. C3464-K03- C	03-144-6019- 6		SCHEMATIC DIAGRAM

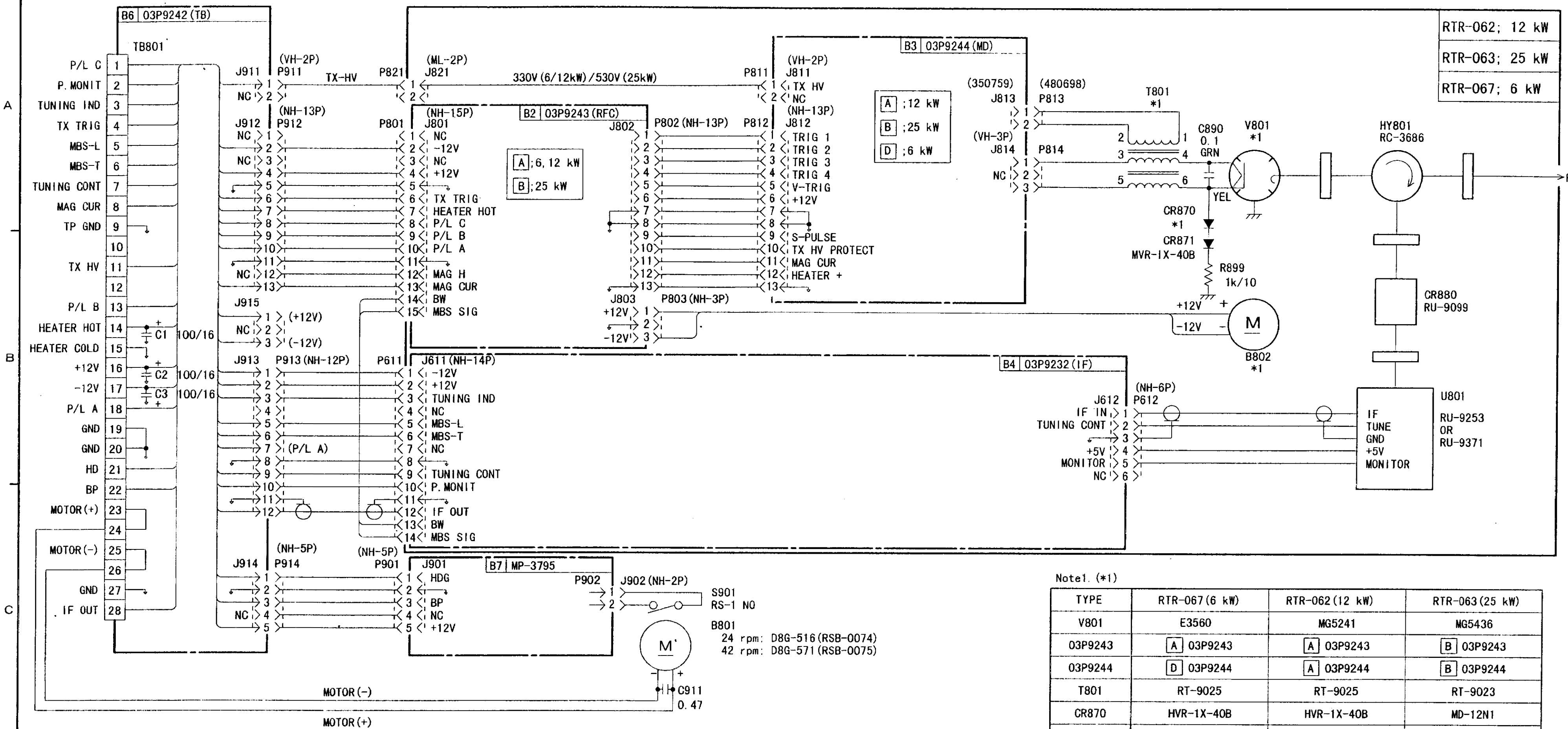
FURUNO ELECTRIC CO., LTD.



PWB	ANTENNA	JP91	JP92	R98
03P9246 A	24rpm	Cut	Cut	4.7 k
03P9246 C	42rpm	Cut	Short	1.2 k

DRAWN Sep. 4 '98 E. Kuchi		TYPE 03P9246
CHECKED Sep 4 '98 K. Okamoto		名称 DC電源基板
APPROVED Sep 4 '98 M Yamamoto	FR-2125 FR-2115	回路図
SCALE / MASS kg	APPLICABLE TO: (MODEL) BLOCK NO.	NAME PTU BOARD(DC)
DWG NO. C3464-K18- B	03-144-6020- 5	SCHEMATIC DIAGRAM

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Note1. (*1)

TYPE	RTR-067 (6 kW)	RTR-062 (12 kW)	RTR-063 (25 kW)
V801	E3560	MG5241	MG5436
03P9243	A 03P9243	A 03P9243	B 03P9243
03P9244	D 03P9244	A 03P9244	B 03P9244
T801	RT-9025	RT-9025	RT-9023
CR870	HVR-1X-40B	HVR-1X-40B	MD-12N1
B802	——	——	109P0824H602

DRAWN Sep 4 '98 T. YAMASAKI		TYPE	RSB-0074/0075
CHECKED Sep 4 '98 K. Kusunoki	FR-1505/1510/1525M3	NAME	ANTENNA UNIT
APPROVED Sep 4 '98 K. Kusunoki	FR-1710/1725 FR-2115/2125		SCHEMATIC DIAGRAM
DWG. No. E3464-K02- F	03-144-6021- 1		

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